The
Geographical Journal.

No. 5. NOVEMBER, 1893. Vol. II.

JOURNEYINGS IN THE PAMIRS AND CENTRAL ASIA.*

By The Earl of DUNMORE.

Landing at Karachi early in February 1892, I proceeded up country, *viâ* Multan, Lahore and Jhelum, to Rawal Pindi in the Punjab, where I commenced making preparations for an expedition to the Pamirs and other parts of Central Asia by way of Kashmir and Western Tibet, and over the great mountain ranges of the Eastern Himalayas and Mustagh or Ice Mountains into Chinese Turkistan. I reached Kashmir in April, and Leh in Ladakh in the end of May. There I was joined by Major Roche of the 3rd Dragoon Guards, who had obtained a year's leave, but although he had a permit from the Government at Pekin to cross the Chinese frontier, he unfortunately was not able to procure one from St. Petersburg to enter Russian Turkistan. We purchased fifty-six strong wiry little Ladaki horses or ponies, and engaged thirty picked men (Argoons), all old hands, some of whom had accompanied those intrepid explorers, Captains Bower and Younghusband into Central Asia, and who in addition to being first-class caravan men, combined also the various trades of shoeing-smiths, pack-saddle makers, shoe-makers, Durzis, etc.

Our caravan being fully equipped, horses properly shod, etc., we marched out of Leh in June rather an imposing company, as we had requisitioned seventy yaks to accompany us over the Kardung Pass, the gate of the Eastern Himalayas, that pass being impracticable for laden ponies. The regular trade caravans going north never attempt the passage of the Kardung before the middle of July on account of the snow, but we managed with very little difficulty to cross it on June 23rd.

Crossing the Shyok River, we passed through the Nubra Valley, struck the Tutialak River, crossed the Great Sassir Glacier, camping at

* Read at the Royal Geographical Society, July 3rd, 1893. Map, p. 480.

a height of over 18,000 feet, we eventually found ourselves on the Great Depsang Plateau, which we named the "roof of Asia." Ascending an unnamed pass of 18,330 feet, to which we gave the name of Peyma-laptse (the Tibetan for butterfly), after a beautiful butterfly we saw on the summit, we were much astonished to find no descent on the farther side. It was exactly like going up a ladder and stepping on to the flat roof of a house, for from the summit of the pass we stepped on to this level table-land, a burning desert of sand and shingle, strewn with the bones of animals and bleached skeletons of horses, and notwithstanding the high altitude absolutely devoid of snow. This plateau extended north for 26 miles, and as far as we were able to judge was about 40 miles from east to west.

Thence we descended to the Chip-chak River, and rode up the Karakoram River, camping at the foot of the great pass at an altitude of 18,000 feet, the highest altitude we ever slept in. On July 9th we made the passage of the Karakoram, about which we had heard so many astounding tales, and having crossed a great many passes since, and a few before, I have no hesitation in saying that out of the many we had to negotiate between Kashmir and the Tian-shan mountains on the Russo-Chinese frontier, this pass was one of the very easiest. I do not think any one knows the exactly correct height of it. I believe the last time the altitude was taken officially was twenty years ago by some of the officers attached to the Forsyth Mission to Yarkand, with I believe a mercurial barometer. We took the height with aneroid barometers—two of Negretti & Zambra's newest and best instruments —and made it 18,880 and 19,100 feet; and the Russian traveller, Prince Galitzin, told me he had taken it with the boiling-water test, and made it 19,050.

On entering the pass we came upon the remains of forty-one horses and one human being, so that, under certain conditions, there is no doubt that the pass may be a deadly one. One of our horses fell down dead on the far side of the pass. On leaving the summit we were joined by a pair of old ravens, who live there, and attach themselves to each caravan, following it north as far as the Chinese frontier fort of Suget, where they invariably take their leave, and fly back to their home on the Karakoram. The caravan men were very superstitious regarding these birds, who did accompany us all the way to the Chinese frontier, and we used to put food out for them every night and morning.

On the north side of the Karakoram the Yarkand River has its source; and not far from the water's edge, about half-way down the pass, stands the cairn erected by Captain Bower to the memory of Andrew Dalgleish, the Central Asia trader, who was treacherously murdered by a Pathan, the words, "Here fell Andrew Dalgleish, murdered by an Afghan, April 6th, 1888," being carved in English and Persian on a marble slab which surmounts the cairn of rough stones which marks

the spot of the murder. I met Captain Bower the other day in Simla, and he was very much interested to hear that the monument was still standing, as he feared it might have been swept away by the melting snows.

For the next four days we gradually descended, following the course of the Yarkand River until it lost itself to view, flowing, as it does, for some miles underground, to reappear again under the guise of about one hundred bubbling springs of clear water, contained in about an area of two acres of ground.

During these four days our lowest altitude was 16,800 feet; and on the fifth day we crossed the Chinese frontier, over the Suget Pass of 18,680 feet, in a snow-storm, and, descending 5500 feet, found ourselves in two days at the Chinese fort, where we were hospitably entertained by the commandant, Ching Dolai. Here we had hoped to have been able to re-provision the caravan for a two months' march on to the Pamirs; but the Chinese either could not or would not provide us with the large amount of flour and grain we required. The consequence was, we had no choice but to proceed to Yarkand, and try and make the Pamirs from there.

While at the fort we heard that the Kilian Pass was not practicable, owing to the great amount of snow. So we settled to go by Sanju, a route which, Ching Dolai informed us, was closed by special order of the Emperor of China, owing to raids made by some wild tribesmen on caravans, the last of which resulted in the murder of some Yarkandi merchants and the selling of their caravan men into slavery. We were, however, determined to pursue this route, and risk meeting these freebooters, telling Ching Dolai that we were a strong party, well armed, and quite able to take care of ourselves.

So we rode up the valley of the Karakash River for four days, through magnificent scenery, until we reached the Boschut defile, which narrow, steep, and uncompromising gorge was the entrance to the Grim Pass.

I forgot to mention that the morning we left the fort the two Karakoram ravens sat perched on some rocks, watching the men loading the ponies; and when we marched, they spread their wings, and flew in the opposite direction, presumably back to their home on the Karakoram.

We made the passage of the Grim in a thick snow-storm, the altitude being 17,330 feet, the last 1000 feet of which was as difficult as it was dangerous for the transport animals, the yaks lying down and refusing to move, and even the unladen ponies showing the same signs of distress. At one time I thought we should be beaten back; but by dint of sheer hard struggling, not unattended with danger to both man and beast, we managed to reach the summit of the pass (which is in reality the summit of the mountain), and found ourselves on a razor-

backed ledge, where there was barely foothold, so narrow and sharp was the top. As it was snowing hard and very thick, we could see nothing in front of us but a fearful-looking precipice, down which we had to descend in a thick mist. When we with extreme difficulty, and at the risk of breaking our necks, got down about 2000 feet on the north side of the pass, and clear of snow-storm and mist, a sight met our eyes which was as unexpected as it was beautiful and refreshing. Below at our feet lay miles and miles of lovely green downs, the grass growing almost up to the tops of the hills that sloped gently down to them.

Three hours' march brought us to Kichik Ilak, where there was a large Kirghiz encampment, these hospitable nomads receiving us with every demonstration of friendship, and bringing us presents of yak's milk, curds and whey, etc. Having the utmost confidence in these people, we remained in their camp for two days, to rest ourselves, as we had been walking and riding for seventeen consecutive days, at a daily mean altitude of 16,680 feet above sea-level, the distance covered being 258 miles, over eight mountain passes, six of which were over 18,000 feet high.

Leaving our kind Kirghiz friends, we rode for two days down the Sanju River, and on the third day, instead of continuing down the river, following the route taken by the Forsyth Expedition in 1873, we turned off due east up a river called the Arpalek, to explore and, if possible, cross the Chuchu Mountains, and see what lay on the other side of them. Crossing the Arpalek River about one mile above its junction with the Sanju, we proceeded in a north-easterly direction, and, climbing a steep cherai, found ourselves in a high, narrow defile, which we conjectured must be the entrance to the Chuchu Mountains, which did not appear to us very formidable after the Eastern Himalayas and Kuen Lun ranges. We ascended 3520 feet, and crossed the mountains in the evening of the same day at an altitude of 12,500 feet. It was a long and a steep pull, and several of our ponies came to grief with their loads, and some of the men got hurt trying to save the ponies rolling over the rocks. After a long and weary march of 22 miles over the mountains we halted, and the next day found ourselves in a country sufficiently uninteresting to warrant my not saying anything about it. It was quite uninhabited, until two days later we struck a sort of farm on the Poski River, 20 miles from Sanju. The Poski River being only 9400 feet, we found the temperature warm and pleasant, and the people of the farm very hospitable, but much astonished at seeing a European. Needless to say, we never saw the wild tribesmen, nor do I believe that they exist. Major Roche and I made as careful a survey of that bit of country as circumstances would permit of, a small map together with some photographs and sketches being the result.

Sanju was reached on July 25th, and we arrived at Yarkand early

in August, the distance covered being 953 miles from the start and 790 miles from Kashmir.

Yarkand in ancient times was the capital of the country, and although no longer the metropolis, is still the most popular as well as the most wealthy city in the whole of Kashgaria, called by the Chinese "The New Dominions." Like all cities of Central Asia it is fortified, and like Kashgar has two distinct cities, the old and the new; the former is entered by five gates, and the latter, Yangi Shahr, as its name in Chinese, Mangshin, denotes, is simply a large fort, entered from the east by a double gate over a drawbridge, which spans a ditch 30 feet wide and 30 feet deep. Within this fort are 400 houses, and a population of 2000 souls, whereas the Kuhna Shahr, or old city, and suburbs contains a population of 60,000.

Just at this time all sorts of rumours were flying about the bazaars regarding the movements of the Russians on the Pamirs, the result being that a Chinese force was despatched to that region, and we followed in its rear.

On the second day out we marched across the Desert of Shaitan Kum, after emerging from which we entered a mountainous country again, and passed through many curious defiles, where in some places the stupendous rocks on each side almost met overhead.

On August 22nd we crossed the Kara Dawan, or Black Pass, and found ourselves overlooking the most gigantic basin, in which we counted thirteen small ranges of mountains between us and the blue haze that enveloped the far hills. The descent of 2500 feet was very steep, and we had as usual to make it on foot leading our horses.

The black shale over which we travelled showed plainly the presence of coal and iron, the sides of the hills being streaked with unmistakable veins of those valuable minerals. We soon came to a dead-lock at the far end of the ravine in the shape of a high waterfall, the stream that we were following tumbling over an apparently white marble precipice several hundred feet deep. With difficulty we made our way down a steep zigzag path to the bottom of the waterfall, the water of which was quite salt. All around lay the dead horses of the Chinese, who had been less fortunate than ourselves in making the perilous descent.

Next morning we rode down the Kiaz River, through the yellow hills that give to Sari-kol its name, "Sarig" meaning yellow, and "kol" the Kirghiz name for a wide valley, as distinguished from "gilga," a gorge—not "kul," a lake. Thence through sparsely-cultivated valleys where the natives were busy threshing their corn, the process being as follows: the corn is laid down on the ground and a pole stuck in the middle of it, to which is attached six donkeys and four cows abreast; a boy runs behind with a whip, and the animals trot round and round the pole, treading out the ears of corn as they go.

At the junction of the Kiaz and Charlung Rivers we altered our course from south to west until, after two days' riding, we reached Chehil Gumbaz, where stands an abandoned fort built by the Chinese.

At Tashkerim we came across the Chinese troops, who, having left Yarkand with the ostensible object of marching on to the Pamirs, had taken up a permanent position at this spot and never got any further. Rejoining Major Roche about a mile from the Chinese camp, we continued riding up the river, gradually ascending from 6700 to 10,800 the elevation of Chehil Gumbaz, and the following day crossed the Tarut Pass, 13,600, ascending 2800 feet in 2½ miles, or nearly 1 in 5.

The next day we journeyed up the Toilobolong River through the wild and almost impassable ravine which bears the same name. After some hours of break-neck work, ascending 4000 feet the while under a burning sun, we found ourselves on a piece of open tableland at an altitude of 13,800, a plateau of rough coarse grass and granite boulders, and in front of us rose the great snow-clad Mountains of Sarikol, the eastern barrier of the Pamir region. After leaving this plateau, we kept ascending until the cold of the declining day became almost as severe as the noonday heat of the defile had been intense.

About midday next day we came upon a beautifully clear sheet of water, out of which the Yambulak River flows. This lake was surrounded on three sides by stupendous cliffs, rising sheer up 2000 feet from the water's edge, one huge glacier standing out in bold relief in the middle of them, which doubtless gave to the water the most beautiful emerald hue I ever saw. The altitude of this lake, which we took to be the Yambulak, as it lies so near the pass of that name, we made 15,800 feet, and the summit of the pass beyond it 16,530.

The sides of the pass were deep in snow, and the strong north-east wind that we met on the summit did not improve matters in the way of temperature. We had to undergo one of those violently rapid changes of temperature so trying to men even in the rudest of health, there being a difference of 91° between the heat of the plain and the cold of the camp in the morning. After much difficulty and suffering we reached Tashkurgan in two days.

Tashkurgan, meaning stone fort, is the capital of Sarikol; it is but a small village, and the Chinese fort, which gives it its name, stands on a piece of rising ground on the left bank of the river, which rejoices in several names, the proper name being the Taghdumbash River. The fort is manned by eighty-eight men, one officer, and no guns. The population of the Sarikol district numbers six thousand souls and is purely Aryan. The people belong to the Shia sect of Mohammedans, and their language is the same as that of the Shighnanis, from which western district of the Pamirs they originally migrated.

We remained a day or two at Tashkurgan to re-victual the caravan, and also to give the sick men a rest; and, after riding up the left bank

of the river in a southerly direction for three days, arrived at the dilapidated Fort of Ujad Bai, which stands at the fork of the Khunjerab and Mintaka Rivers. Striking off to the westward from this point, we entered the Taghdumbash Pamir, and, after three days more riding, established ourselves in a permanent camp on the Kukturuk River, where we remained for fifty-five days. It was owing to our camp being laid out on military lines on a square 60 yards to each face, and our making a road round it and building a stone kitchen in the centre that gave rise to the rumour that the English had built a stone fort on the Pamirs, and caused a Mandarin to travel from Kashgar, fifteen marches to our camp, only to find the stone fort was a kitchen. Our caravan, which by then mustered sixty horses, and with Kirghiz followers about forty men, was also magnified into an armed English force. The Chinese were very jealous of our having established ourselves on their Pamirs, and gave orders to Osman Beg, chief of the Kirghiz of Mintaka, not to supply us with any food for men or horses in the hopes of starving us out of the country, and as soon as we struck our camp in October they demolished our stone edifice, still believing it to be a fort.

The weather began to get very cold at the latter end of September and beginning of October, the thermometer registering minimum temperatures of from 5° to 8° below zero every night, and sleeping out without a tent up in the hills, when shooting Ovis Poli, was rather cold work. During our stay in the permanent camp, we made several exploring expeditions, amongst others, crossing the Hindu Kush by the Kilik Pass, which we found was a shorter way to Hunza and Gilgit by three days than over the Mintaka Pass, which is the usual route.

On hearing that the Russians had turned the Chinese out of Aktash, a fort at the east end of the little Pamir, and demolished it, I resolved to go and verify the statement, which, like all Kirghiz rumours, had to be taken *cum grano*. So, leaving Major Roche at the permanent camp, I started with five men for the valley of the Aksu River, and, crossing the Beik Pass, 16,370 feet, arrived after four days' marches at the Fort of Aktash, which I found in ruins, not one stone standing upon another.

After my return to the permanent camp at Kukturuk, we struck our tents and started for the middle and upper Pamirs, riding in a westerly direction up the valley of the Wakhjir, having previously despatched those of our sick who could not stand the cold of a Pamir winter across the Hindu Kush to Gilgit.

We crossed the Wakhjir Pass, 16,680, which is the frontier between Chinese and Afghan territory, and when we descended and struck the Ak Bilis River, we found ourselves in the Wakhan district of the Pamirs and within the dominions of the Amir of Kabul. Riding for two days down the Ak Bilis River we reached Bozai Gumbaz, a now historical spot, as it was there Captain Younghusband's progress was arrested by the

Russians in 1891. From there we proceeded east, to the Chakmak Kul, and passing the source of the mighty Oxus which we claim to rise simultaneously with the Aksu River at the east end of the lake, we crossed the mountains of the little Pamir by the Andamin Pass (15,150) and debouched on to the great Pamir Plateau in a heavy snow-storm. It was just before crossing the pass that we came across a bare, gaunt, hungry-looking dog, who, having lost his Kirghiz or Dakki master, attached himself to our caravan and soon got quite tame. To him we gave the name of Pamir.

Our objective point after entering upon the great Pamir was Wood's Lake, now called the Victoria, and what between the stupidity of Abdul Kerui, a Kirghiz who pretended to know the locality of the lake, and the advent of a heavy snow-storm, during which we lost our caravan, we found ourselves at night (November 4th) on the bank of the Chistoba River, a long way north-east of the lake and well out of our course. The next morning we worked our way by compass and crossed a small pass, 15,130, which for want of a better we named the Fox Pass, as our dog Pamir ran one to earth on the summit. In the evening we came within sight of a lake which turned out to be one of the small lakes, the western extremity of which lies about 3½ miles from the east end of the Victoria, which lake we sighted next morning. We rode along its north shore for two days making short marches, as our mornings were occupied taking observations, sketches, and photographs.

On the third day we camped about 8 miles down the Pamir River, which flows out of the west end of the lake, and forms a junction with the Ab-i-panj at Langar Kisht, and is, therefore, a tributary of the Oxus.

As we lost twenty-three of our horses during the night, it was late before we recovered them, and were able to make a start to explore the mountains between the Khargosh Pass west, and the Bash Gumbaz Pass east, our object being to discover a pass that led straight from the west end of the Victoria Lake over the mountains to Yashil Kul, a lake lying at the west end of the Alichur Pamir. So choosing an open-looking, but very stony nullah, we rode up it due north for 8 miles until we came on to a circular plateau in the midst of wild stony hills, altitude 14,900. In front of us was a ridge which we took to be a watershed, but on reaching the summit (15,230) we saw we were mistaken, as ¾ mile farther on was a narrow pass, on the summit of which (15,700) was a small but perfectly square frozen lake, and its peculiarity lay not only in its perfectly rectangular shape, but in its close resemblance to an artificial reservoir, its sloping sides being paved by nature with flat stones fitting closely together, giving it all the appearance of a piece of solid mason work. We therefore named it the Hauz-Dawan or Reservoir Pass. From the Hauz-Dawan we descended in two marches on to a flat sandy desert, 300 feet below which was a large basin extending

east and west for miles. In it were four lakes: one, the Sasik Kul, 3 miles long by 1 broad; two, the Tuz Kul, and two smaller ones, the last being the Khargosh-Kul at the end of the stream running from the Khargosh Pass. The altitude of these lakes was 13,400 feet, and the whole basin which contained them was encrusted with saltpetre. Rising onto a ridge we came to another small pass which we named Guljia-Dawan, from the large amount of horns and skulls of these animals (ovis poli) that we saw lying about. From this pass, which is not marked on any map, we had a fine view of the hills of Shighnan. We reached Bulun Kul, 13,200 feet, and camped at an abandoned Afghan outpost. The next morning (November 9th) we pushed on to Surmatash, skirting the shores of the Bulun Kul, until we came to the river which connects the two lakes—Bulun Kul and Yashil Kul. In none of the maps are these two lakes made to have any connection with each other, whereas they are in point of fact almost one, the little river which connects them being but ½ mile in length. Bulun Kul lies south-east of the Yashil Kul. This latter lake is the next largest on the Pamirs to the Kara Kul, being about 16 miles long. It lies east and west. The Ghund River, which rises at the west end of the lake, flows into the Ab-i-Panj, and is one of the many tributaries of the Oxus.

Surmatash is the spot where only a few months before the unfortunate conflict took place between the Russians and Afghans, concerning which (as it comes under the heading of politics and not geography) I shall be mute. Close to the scene of the fight we found four Afghan great coats lying on the ground; they were all more or less blood-stained, and on examining them closely could see pretty clearly how their ill-fated owners had met their deaths. One had seven bayonet or lance thrusts through it. Another had the left arm almost severed through at the elbow, and the other two were in worse plight. The dead Afghans were all buried in one grave on a hillock just above the river. They are not interred, but all huddled up together inside an enclosure composed of four low walls built of rough stones. Over the bodies have been thrown two namdahs, over which some mud has been sprinkled, the whole kept down by five large stones to prevent any beast of prey from scraping up the corpses.

Leaving this now historical spot, we marched for five days through the Alichur Pamir along the river of that name, arriving on the third day at the Nezatash Pass, 14,430 feet. There we fell in with a Cossack patrol, who finding one of our men looking for a stray horse, took him to be an Afghan and threatened to shoot him, but on seeing us approaching left him alone.

Two days after crossing the pass, we arrived at Murghabi, Colonel Yonoff's head-quarters, where we were very well and hospitably received by the Russian officers in charge of the fort, as the Colonel had just left for Tashkend. There we remained for two or three days,

as our kind hosts would not hear of our leaving them, and we soon became the best of friends. At the end of November we marched to Rang Kul, another smaller Russian fort, accompanied by Captain Brjesicki. We camped one night at Ak-Baital, where I was much amused at overhearing the following conversation between Major Roche and Captain Brjesicki. The former was asking the latter in French the meaning of the word Ak-Baital.

Brjesicki, whose knowledge of the French language was limited to about half-a-dozen words, one of which was "*cheval*," was cogitating deeply how to translate the word, Baital (a mare) into French. He knew that Roche understood the meaning of the prefix ak (white), but how to convey the translation of the word Baital. At last a bright thought struck him, and he exclaimed triumphantly, "Baital—*Madame Cheval*."

The next afternoon while riding along the southern shore of the frozen Lake of Chor-Kul, we came upon the curious Lamp Rock. On reaching the end of the Chor-Kul, which is from 6 to 7 miles long, we came upon the Rang Kul, another smaller lake, separated from the Chor-Kul by a quarter of a mile of land, no stream even connecting the two pieces of water; and yet on most of the maps they are represented as one large lake under the name of Rang Kul.

It was a bitter cold ride of 28 miles from Ak Baital to the Russian fort, where we arrived three hours after dark, with the thermometer at 15° below zero. There was but a small force of Cossacks there under the command of two officers, who made us most welcome, and administered as best they could to our wants.

The next day we found the thermometer had been as low as 25° in the night, and we all agreed as to Rang Kul being the coldest place on the Pamirs. One of our horses died of cold the day before. The fort is situated at an elevation of 13,500 feet above the sea, on the edge of an immense plain.

In the afternoon of the second day we spent with our kind hosts, the weather gave us some sort of idea of how cold it could be, as the thermometer fell to 10° below zero in the afternoon; so we had recourse to various expedients to keep ourselves warm. We were genuinely sorry to leave our hospitable quarters and the cheery good fellows who had been our hosts, but December was fast approaching. We started the next morning and marched to the foot of the Ak-Berdi Mountain, crossing the Kokbeless Pass, 15,300 feet *en route*, from the top of which we had a splendid view of the great Mustagh-Ata, whose rugged ice-bound peaks rose some 25,800 feet into the wintry sky.

The Ak-Berdi being the Russo-Chinese frontier Captain Brjesicki bade us adieu there, and we commenced to make the ascent of this mountain, which was deep in snow, the last 1500 feet of which was as bad as the Grim Pass, and we had no yaks. The cold was intense,

with a north-east wind blowing the loose snow into our faces. We managed after several hours' struggling to get over the summit (for there is no pass), and the next day we reached the Chinese fort of Bulun Kul where we remained for the night in a Kirghiz Akoi. Here we had some difficulty in persuading the Chinese officer to allow us to pass.

Riding for 8 miles along the shore of the Bulun Kul Lake and passing the second Chinese fort at the north-east end of it, where the Gez River has its source, we entered the Gez Defile and camped at the first convenient spot. The river runs through a deep narrow gorge on the left of the track which is impossible to see in some places, and which leads over miles of stones and rocks all heaped up in wild confusion, intersected every now and again by deep and almost impassable dry watercourses, all the result of recent landslips. The next day it blew a gale and the landslips were too frequent to be pleasant.

That night we camped near some hot springs. The third day the defile widened out a little and opened up fresh beauties to our appreciative eyes at every turn, as we proceeded further eastwards. The scenery, in fact, became so savagely grand that we ceased to grumble at the roughness of the country over which we were travelling, and at our very slow means of progression, viz., 19 miles in two days.

Rounding the base of a huge rock we suddenly came face to face with a scene which will live for ever in my memory. To attempt to faithfully describe its chaotic magnificence is almost impossible. Picture a background of wild rugged mountains, whose snow-peaks towered into the sky. Rocks of every fantastic shape, with huge festoons of icicles hanging from their jagged edges; ice-bound torrents and frozen waterfalls; huge boulders thrown about in the wildest confusion, the whole foreground seeming to have been lately subjected to some mighty convulsion of nature, and then you can form no idea of the savage splendour of this scene of chaos. After gazing for some time with awe and wonder upon this enthralling picture, whose weird beauty was enhanced by a diaphanous haze which floated over it all, we rode on towards the distant blue hills which marked the termination of this wild gorge.

Three days later we reached Kashgar in the evening, where we were hospitably entertained by Mr. Macartney, the English Political Officer there.

During our stay in Kashgar we visited the few places of interest that the country could boast of.

About December 10th both our caravans were re-provisioned and the horses re-shod. (I say both our caravans, because it was here that Major Roche and I had most reluctantly to part, as he could not cross the Russian frontier. So we divided the caravan up, drawing lots for the fifty ponies, thus having twenty-five each.) And we each made a start, he east, to Maralbashi, in the hopes of shooting a long-haired tiger

before returning to Gilgit, and I north-west, towards the Tian Shan Mountains, that divide the dominions of the Emperor of China from those of the Czar. As heavy snow had been falling for some days, fears were expressed at Kashgar as to the feasibility of my crossing the mountains. However, taking with me only eight of our Tibetans, I made a start, leaving behind me, with much regret, Ahmed Din, my interpreter, who had been appointed as munshi to Mr. Macartney, at Kashgar, and could, therefore, proceed no further with me.

The first night I halted at the village of Sulok, and next day continued riding over the dreary plain in a north-westerly direction, passing the old fort of Andijan Kichik, making but little way, as the snow was up to the ponies' hocks. In the evening we left the plain, and, striking the Mingul River, rode up the little valley until we reached a long, low, rambling fort, where we halted for the night.

Crossing the Mingul we proceeded by and across the Kan-su Pass. On the fifth day from leaving Kashgar I arrived at the Kirghiz encampment of Uksalar.

There we stayed two days and then crossed the head-waters of the Kizil-su to the Chinese frontier fort of Ulukchat, which stands some little way up from the river.

Two days later I reached the Russian frontier fortress of Irkishtan, having spent one day in hawking partridges at Yaghan with the Beg of the Kirghiz, who had some fine, well-trained hawks. Irkishtan is prettily situated on a promontory overlooking the River Chenksu, and I was most hospitably entertained by the Cossack officer there for two days; and when I continued my journey he insisted on escorting me with thirty of his men for about half a day's march. The escort, mounted on their little shaggy horses, rode in fours, singing all the time, the rocks echoing back the music of their wild songs, which were extremely tuneful and very well sung.

On December 22nd, I found myself in the heart of the Alai Mountains in very deep snow and with the thermometer varying from 20° to 35° below zero. I crossed three passes—the Kok-Bel, 11,950 feet, the Ek-Zek, 11,600, and the Borak, 11,550, all of them very difficult ones owing to the mass of ice that covered them. On Christmas Eve the temperature fell to 38° below zero, and I woke to find three of my horses lying frozen at my tent door. One was quite dead, the others never recovered. On Christmas Day I made the passage of the great Terek Dawan on foot; it was one mass of snow and ice. It is barely 14,000 feet in height, but the descent of 5350 feet was very steep and a sheet of ice, the last 1000 feet being accomplished by moonlight. It is considered the worst pass in the Alai Range. After marching for two more days, I arrived at the second Russian fort of Gulcha, where there were about forty Cossacks. I was much struck with the neatness and cleanliness of their stabling accommodation.

Crossing three more passes, all small ones, and riding through a magnificent down-country, I arrived at Osh in Ferghana, where I was hospitably entertained by Colonel Grombchevsky, who has lately been appointed to the command of the district.

At Osh I sold my horses, tents, and camp equipage, having no more use for them, as the remainder of my journey through Russian Turkistan was accomplished in Tarantass and in sledges. I also parted from my faithful Tibetans, to each of whom I made a present of a pony to ride back to Kashgar, where they intended to remain until the first caravan set out for Ladakh. A better set of men, a hardier or a more willing I have never met with, and during the whole eight months they were with me I never once had to punish any of them or cut them a single rupee of their wages. I also include in this most of the men whom I left with Major Roche. Raudzan, who was our head caravan man from start to finish, I took on with me from Osh through Russian Central Asia until I met Mr. and Mrs. Littledale on their way to Pekin, when I handed him over to them, as they had been disappointed in obtaining the services of another man they had wanted, and I was able to tell them honestly that I considered they had in Raudzan one of the best men in Central Asia.

From Srinagar in Kashmir to Osh in Ferghana, following the route we were forced under the circumstances to take, we had travelled for nearly nine months on horseback, and on foot 2006 miles over thirty-nine mountain passes, some of these amongst the highest in the world, and across sixty-one rivers, during which time I am thankful to Providence we never lost a man and only seven horses.

It is unnecessary to describe here my journey through Russian Turkistan. Let me, however, state that from the time I entered the Central Asiatic dominions of His Imperial Majesty the Czar, until I quitted them, the extraordinary civility I received from high and low, the warmth of the hospitality that was accorded me by all officers from the Governor-General downwards, was so marked that as long as I live I shall not only never forget it but it will be always to me more than a pleasant experience to look back to. Being slightly acquainted with the language helped me not a little, as in the out-of-the-way districts, such as the Pamirs and frontier forts, none of the officers spoke either English, French or German.

Leaving Osh and my good friend Colonel Grombchevsky, I proceeded by Andijan to Marghilan, Khokand, Khojend, and Tashkend, being snowed up more than once.

It was now the middle of January, and my object was to get to Khiva, going round by Kasalinsk and the Sea of Aral; but the Governor-General, Baron Wrewsky, whose guest I was, pointed out to me how hopeless it would be to attempt such a journey at that season of the

year, especially as the Oxus was closed for navigation owing to the ice, and to attempt a land journey in the snow over the Khivan desert in this, the most severe winter known in Central Asia for years, would be little short of madness; so I had most reluctantly to give it up as a bad job. Day by day the weather got more and more severe, and the snowstorms were frequent until at last the mails ceased to run, as the roads were all blocked. Telegraphic communication alone remained open, and that at last was closed; but not before I discovered by means of the wires from Askabad that my long-cherished plan of crossing the Persian frontier over to Meshed, and so working my way down the Afghan frontier, and through Beluchistan to the Persian Gulf was also knocked on the head, all the roads and passes over the mountains being so deep in snow that I was unable to procure a caravan of camels or any other beast of burden to cross the hills into Khorasan; so I determined, as soon as the roads were open across the Steppes, to proceed to Samarkand and take the Transcaspian Railway to Uzunada, cross the Caspian to Baku and take boat from there to Enzeli, ride to Teheran, and so on to Bushire, and reach the Persian Gulf that way. It was on the last day of January that I left Tashkend and started for Chinaz. Through the gorge of Jilan-uti we gradually descended till we reached the valley of the Zarafshan, and shortly afterwards the domes and towers of Samarkand came into view, lit up by the golden rays of a winter sunset.

Leaving Samarkand by the Transcaspian Railway, I arrived at Bokhara the next day, then crossed the Oxus at Charjui, and so over the sandy waste that forms the south end of the Khivan desert, to Merv, Askabad, and the Caspian. All this part of the country has been so well and graphically described by Mr. Curzon, that recapitulation on my part would be worse than useless. Suffice it to say that I crossed the Caspian to Baku, arriving there the very day the boat had sailed for Enzeli, and there was not another for a fortnight. The prospect of a fourteen-days' sojourn at Baku was not agreeable, so I went on to Tiflis, that I had not seen since 1859, when it was but a very small town, and so to Batum, where I took the steamer to Constantinople, and returned to India, landing at Karachi in March 1893, just thirteen months since I had landed there in February 1892.

Before the reading of the paper, the chairman, General STRACHEY said:—The Earl of Dunmore will now read you the account of the remarkable journey he has made during the past year, starting from the Indian side of the Himalaya Mountains, going through to Yarkand, thence into the Pamirs, from the Pamirs back to Kashgar, and from Kashgar through Russian Turkistan to the Caspian. I will leave you now in the hands of Lord Dunmore, who I think will give you an extremely interesting account of this journey.

After the reading of the paper, the following discussion took place:—

Mrs. BISHOP: I was not prepared to speak on this question, but as I have

followed the route as far as the Karakoram Pass, I am extremely interested in all Lord Dunmore has said. One or two questions I should like to ask if I may. I should like to know at what height the vegetation ceased on these high passes which he crossed? In my own experience in crossing the Digar and the Kardong glacier pass, edelweiss in enormous quantities covered the whole of the hill-sides in June at a height of 15,000 feet, and from that up to 16,500 feet, beyond which vegetation, except lichens, ceased altogether. I should much like to hear whether he made any observations on the vegetation of the north and south sides, and I should also be interested in knowing whether he observed the range of the thermometer between noon and midnight at heights of 15,000 feet and upwards? I registered solar temperatures of 157°, which was only I think 32° below the boiling-point of water at the same altitude, but the thermometer at midnight fell to 24°, showing an enormous range in twelve hours; and it has occurred to me that the extraordinary disintegrations of the mountains which one sees in Nubra, and specially in the gigantic mountains at the bend of the Shyok may possibly be attributed to these very rapid changes in temperature, occurring in such a dry climate as that of Western Tibet. I should like exceedingly to have some light thrown upon these two subjects—vegetation and temperature?

Sir Thomas Gordon: As an old traveller in the Eastern Iceland, that wilderness of snow and ice, of which Lord Dunmore has given us a flying account to-night, and shown us some interesting sketches, I should like to say a few words. I wish to speak in praise of the splendid energy which he and Major Roche showed in pursuit of science and sport. We have seen the magnificent ovis poli heads in the next room, the result of forty-five days' stay in the Tagh-dumgbash. I think we must all admire the spirit of enterprise and resolute determination, the love of adventure and sport, and the great powers of endurance the travellers showed in their very severe journey. I have some personal knowledge of the difficulties to be met with in that country. I should like, however, on the part of the Yarkand Expedition, to disclaim all responsibility for those astounding tales which Lord Dunmore heard regarding the Karakoram Pass, for we distinctly reported it as easy of ascent and descent. I think these tales must have come from the Arguns, who were employed, and whose interest it is to exaggerate all difficulties with a view of increasing their rewards. Ever since I led the first exploring party in recent times to cross and recross the Pamirs in 1874, I have observed very closely the explorations which followed ours. The famous Skobeloff immediately replied by passing down from Khokand towards Tashkurgan, and his very able assistant, Captain of the Staff, Kuropatkin, also explored in that direction. Very shortly after that, England and Russia began to vie with one another in gaining a geographical knowledge of that then comparatively little known region, and France and Germany subsequently joined in. England has had, I should say, the biggest share in it in later times. I would mention Mr. Ney Elias, then Younghusband, assisted by Davison, then Littledale, who like the lecturer to-night, was a splendid sportsman, as well as a successful explorer. Lord Dunmore has devoted himself to working in a rather remote corner, and I have no doubt he has gained a great deal of information which may prove valuable in solving the big problem which seems to be presenting itself there for early solution. I congratulate Lord Dunmore and Major Roche upon their very successful journey.

Mr. W. M. Conway: The only remark that I think is called for from me, bears upon the question of the experiences of the party at high altitudes. I notice that Lord Dunmore mentions that he first experienced discomfort, not on the top of but whilst descending from a pass 18,000 feet high. They were at the time on a glacier and probably in a hollow place. That observation, I think, is of importance. It is not

new, but we have so few accurate observations about the effects of high altitudes, that it is important to get any testimony tending to show that you do not necessarily feel the worst effect of diminished air-pressure on the highest points; there are many other factors that enter into the production of that uncomfortable sensation, and one of the most important of these seems the neighbourhood of snow. It seems to me quite clear that in high places upon snow the effects of atmospheric pressure are more marked than in equally high places on rocks. Lord Dunmore observed next that they found it hard to sleep on an occasion when they were for the first time at 17,000 feet; but I gathered that on later occasions they maintained a high altitude for a considerable period and experienced no discomfort. At 18,000 feet, which they again rose to on the Depsang Plain, notwithstanding that they were helped by the wind, which is of great assistance in warding off the effect of diminished atmospheric pressure, they experienced the most marked discomfort. These observations are of importance, because they show that at heights of 17–18,000 feet, as noticed also by Captain Bower in Western Tibet, considerable discomforts were felt, whereas it seems to be the case in Sikkim that mountaineers and travellers can rise to higher altitudes almost without discomfort. Possibly the greater amount of moisture in the atmosphere of the Eastern Himalayas somewhat lessens the discomforts of diminished air-pressure, whilst in the dry atmosphere of the Pamirs and Mustagh regions greater discomfort is felt owing to the dryness.

Hon. G. N. Curzon: I should like to endorse what fell from Sir Thomas Gordon as to the great value of explorations such as Lord Dunmore has so well described to us. Just as Mrs. Bishop found an excuse for speaking in the fact that she had traversed some of the earlier parts of Lord Dunmore's journey, so I might find an excuse in the fact that I have traversed some of the later portions. I have had occasion to go very minutely into the question of the Pamirs and the Upper Oxus, and had intended, but for the disagreeable necessities of Parliamentary life, going to that region myself this summer. Now General Gordon spoke as a member of the first and last organised British expedition to the Pamirs, the last whose record has been given to the public, and although as he says, Mr. Littledale, Captain Younghusband and Lieut. Davison, and Mr. Ney Elias have been since, yet our record of exploration on the Pamirs is not equal in numbers or extent to that of Russia, who has, from year to year, sent parties, nominally scientific, really political, to those regions. Therefore we owe a debt of gratitude to gentlemen who, like Lord Dunmore, tour on their own account, and bring back to us and the Indian Government information of the highest value. The value of Lord Dunmore's travels in this case is two-fold, because, in the first place, he was on the Pamirs at an extraordinarily interesting time; but as what I am now saying touches on the forbidden ground of politics, I cannot pursue it further, but can only admire, and at a humble distance pursue the remarkable discretion in this respect that Lord Dunmore has shown. The second point on which we owe him gratitude is for the positive additions he has made to geography, to which, after all, as a Geographical Society, we attach higher value than anything else. Lord Dunmore and party passed over thirty to forty passes of great altitude under the severest conditions of atmosphere and temperature. Some of these have never been crossed before by Europeans. Further, by his discoveries, he has rectified our ideas about the peculiar chain of lakes existing in the region of the Upper Oxus. Firstly, there is the succession of small lakes, in or near to which the Oxus is said by him to rise. Then there is the cluster of lakes round Yashil Kul, on the Alichur Pamir. Finally, he has acquainted us with the fact that the lake called Rang-Kul is, in reality, two lakes, of which Rang-Kul is the smaller. These are, I think, positive additions to our geographical knowledge. There is one point on which I desire to ask a

question. Lord Dunmore, in his paper, talked about the real source of the Oxus, and on the screen showed us a fascinating picture of that river emerging from Lake Chakmak. I think in General Gordon's book, or in one of Colonel Trotter's maps, this is given as Oi Kul. Now, the river which rises in this lake, and then flows northwards, is the Aksu, which later on becomes the Murghab, and, after making a great bend to the west, rejoins the Oxus (as commonly accepted) at Kila Wamar. But there is another stream which some people insist upon regarding as the true source of the Oxus, where the upper portion of the Wakhan River, known as the Ak Bilis, rises just north of the Wakhijir Pass amid three great glaciers, which a Frenchman, M. Dauvergne, visited two or three years ago. I cannot help preferring that the Oxus should be held to rise in these great glaciers rather than in an insignificant lake; and I venture to suggest that this, and not the Aksu, the resemblance of whose name to the Oxus is purely accidental, should be regarded as the true parent stream. I have one other thing to say: Lord Dunmore's paper illustrated in an interesting manner the national traits of the various peoples scattered over this remote tableland. First, there are the Kirghiz, genuine nomads, and, I believe, almost always hospitable and generous to travellers. Then there are the Chinese, on political grounds supposed to be friendly towards us, a characteristic which they do not invariably show. Whatever their attitude towards foreigners, their political position on the Pamirs is most inefficient. I do not believe in the wonderful things the Chinese are going to do on the Pamirs. The most gratifying feature, however, to which Lord Dunmore paid a generous tribute, is the civility and courtesy of the Russians. Nobody can deny the fact that the Russians on the Pamirs are possible rivals to ourselves, and it is therefore particularly gratifying that, when a Russian officer comes in contact with an English traveller, they should meet as gentlemen and friends. Even when Captain Younghusband was turned out by the Russians from Bozai Gumbaz, nothing could exceed the politeness of the officer who turned him out. It is gratifying that these great national rivalries, which are too great to be entirely obliterated, do not interfere with the courtesies which should and do prevail, more particularly in inhospitable regions such as Lord Dunmore has visited. I trust that not merely the substance of the paper, but also the admirable illustrations from his own brush will shortly reappear in the book, which, I understand, Lord Dunmore is about to publish, and I hope the rest of this assembly will follow my own example by buying a copy the first day it appears.

Lord DUNMORE replied: In answer to the questions put to me by Mrs. Bishop, I can only say it was a cause of serious regret to me that I had not a botanist with me, as I myself know little or nothing of botany. I have noticed the ice-plants to which Mrs. Bishop refers; but only on the comparatively low passes between Gulcha and Osh in Russian Central Asia. I never saw any on the high passes in the Kuen Lun, Mustagh, or Himalayan ranges; but as most of those passes were deep in snow we were unable to see what was underneath the snow. I cannot think there is vegetation of any sort above 16,000 feet, as there is no animal life. The edelweiss I never saw at all. As to the great variation of temperatures, I regret that I have not by me to-night the meteorological observations taken by Major Roche and myself, but I can recollect variations of 85° to 90° between dawn and midday, especially on the Pamirs.

General Gordon was good enough to make some remarks. I read his book with great interest before starting on this expedition, and followed the track of the Forsyth Expedition from Leh to Yarkand. As regards the correctness of the altitudes, the General knows as well, or probably better than I do, that it is impossible to place any reliance on the reading of aneroids over 16,000 feet elevation above the sea-level; some of our instruments would vary only 50 feet at 12,000 feet,

and at 16,000 feet would vary 300 feet. We shall never know the correct altitudes of these passes until a proper trigonometrical survey is made. I had my instruments corrected on my return to India, and have in consequence deducted 320 feet off all the altitudes I took.

In reply to Mr. Conway's remarks regarding difficulty of respiration at abnormally high altitudes, I can only say that my experience coincides with his. The first time I suffered from the great rarefaction of the air was not by any means at a great altitude, only about 16,000 feet, when in trying to make a hole with a pickaxe in which to sink my tent-pole, I suddenly felt giddy and light-headed and fell flat on my face on the ground. At 19,000 feet we felt no discomfort, whereas at lower altitudes it was sometimes almost impossible to breathe if one made the slightest exertion.

Mr. Curzon has asked me some questions with regard to my determining the Oxus source at the north-east end of the Chakmak Lake and not in the Sarhad River source. My reasons for so doing are as follows: Between the source of the Sarhad and the Chakmak Lake is a very low watershed; on the south-west side of this watershed is the source of the Sarhad River, which joins the Ak-Bilis under the walls of the Tomb of Bozai at a place called Bozai Gumbaz. Their joint waters flow to Ishkashem, whence they run north under the name of Ab-i-panj, until they reach Kala Wamar, a distance roughly measured by me as 240 miles, and receiving on the way the waters of the Pamir River which rises at the west end of Victoria Lake, and the Ghund River which runs out of the Yashil Kul. On the north-east side of this watershed is the Chakmak Lake, out of which flows the Aksu River. I believe myself that Oxus is a corruption of the old Kirghiz name of Aksu, meaning white water. This river, which we believe to be the true Oxus, flows north-east to Aktash, receiving the waters of the Beik, Chistoba and a few minor rivers. It then takes a turn west to Murghabi on the Sarez Pamir, and receiving the waters of the Ak-Baital runs past Colonel Yonoff's headquarters, where it becomes the Murghab River; thence west until it becomes the Bartang, and so on to Kala Wamar, a distance from its source of 252 miles. This Aksu is therefore 12 miles longer and with a greater volume of water than the Sarhad. Mr. Curzon made mention of the Kirghiz and Chinese. I lived amongst the former for six months, and a quieter or more honest set of people I never met. As to the Chinese troops I could not judge about them, as they had but twelve men on the Pamirs in 1892.

General Strachey: It only remains for me now to return thanks to Lord Dunmore for the extremely interesting paper he has read to us.

The Map to Lord Dunmore's Paper.—The map which accompanies Lord Dunmore's paper is taken from Johnston's "Royal Atlas," and is intended only to show his route. A few corrections have been made, but the map does not contain the most recent additions to our knowledge of the Pamirs. The information brought home by Lord Dunmore, together with the work of other recent explorers, Russian and English, will be embodied in a map which is in preparation in the Society's offices. Reference may also be made to the map of the Pamirs accompanying Captain Younghusband's paper, *Proceedings* R.G.S. Vol. XIV., p. 272.

ROUTES AND DISTRICTS IN SOUTHERN NYASALAND.*

By Lieut. B. L. SCLATER, R.E.

During the two years which I have just passed in the new Protectorate of British Central Africa, as assistant to Mr. H. H. Johnston, C.B., H.B.M. Commissioner, I have been much pressed with official work of all kinds, as was quite to be expected in the case of instituting an entirely new government for a territory larger than France, and have not been able to accomplish so much geographical work as I could have wished. Nevertheless I trust that some information that I have been able to put together concerning the principal routes and districts in the Shire Highlands or Southern Nyasaland, as is the official name of the district immediately south of Lake Nyasa, may not be unacceptable to the readers of *The Geographical Journal*, and be of some use to visitors to British Central Africa. I will take these routes and districts in the following order :—

I.—From Chinde to Chiromo.
II.—The District of Chiromo.
III.—From Chiromo to Chikwawa.
IV.—The West Shire District.
V.—From Chikwawa to Blantyre.
VI.—The Blantyre District.
VII.—From Blantyre to Milanji.
VIII.—The Milanji District.
IX.—From Chiromo to Milanji.
X.—From Milanji to Zomba.
XI.—The Zomba District.
XII.—From Zomba to Mpimbi.
XIII.—The Upper Shire District.
XIV.—From Mpimbi to Fort Johnston.
XV.—The South Nyasa District.

I.—From Chinde to Chiromo.

The best point from which to reach British Central Africa is the lately opened Port of Chinde, situated at the Chinde mouth of the Zambesi. There is now regular communication with this port by coasting steamers every month from Mozambique, in connection with the German East African Line, and every six weeks from Durban, by the Union Line. Moreover, Messrs. Rennie run a steamer from Durban to Chinde in connection with their direct "Aberdeen Line" from London to Port Natal.

At Chinde, in accordance with our treaty with the Portuguese Government, a block of land with a frontage of 400 metres has been leased to the British Central African Administration, to form a bonded warehouse under British management. Here goods can be landed free from Portuguese duties for transport up the Zambesi to British territory. The British Central African Administration have an agent in charge of the Concession, and the chief firms trading in British Central Africa have

* Map, p. 480.

established stores and offices here. The Concession lies about a mile above the entrance to the river on the right bank, *i.e.* to the left on going up. The Portuguese town of Chinde, which is to the east of it, has been laid out in plots, many of which are taken up for building. There are several European firms trading here and a number of stores kept by Banyans. Chinde is in telegraphic communication with Kiliman *viâ* Sombo, and so with Chiromo and Sena, the main line to these stations starting from Kiliman. Unfortunately the line is not well maintained, and messages often take two or three days and even a fortnight to reach Chiromo from Chinde.

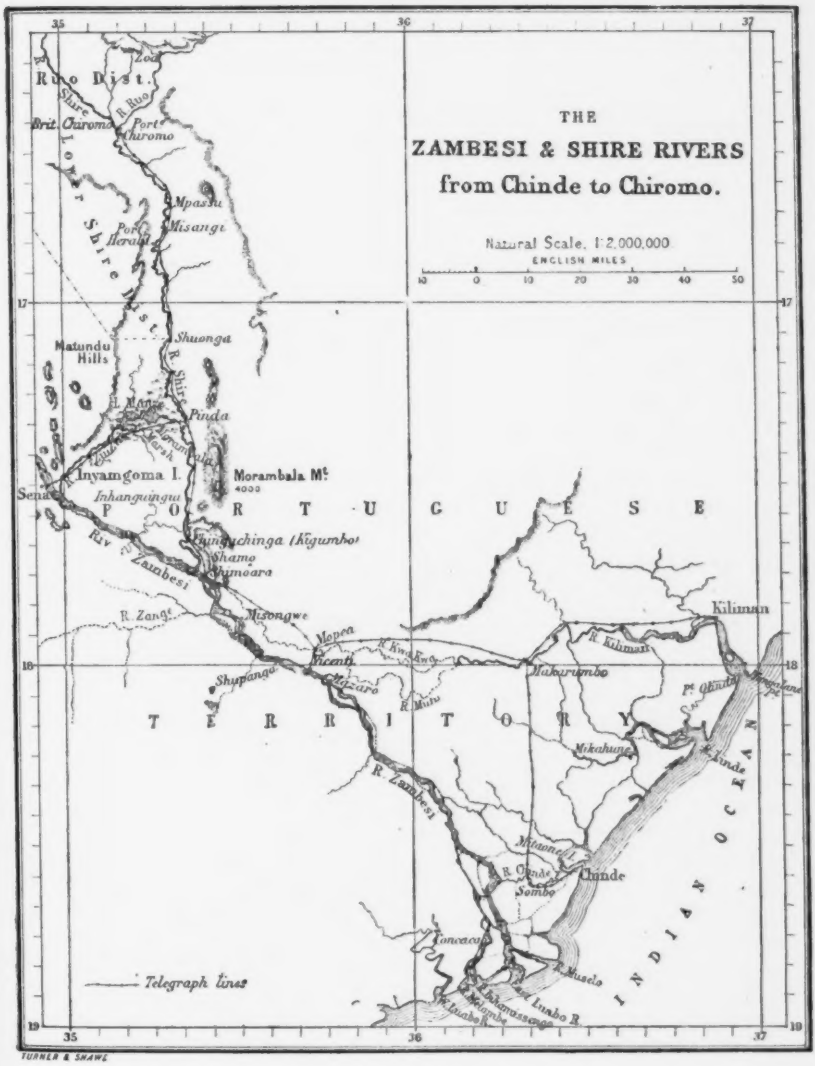
Chinde is fairly healthy, as it is built on a sand-spit, and gets a fresh sea-breeze at the back. There is also a good supply of small timber for building, and abundance of fuel close at hand.

From Chinde the voyage up the Zambesi and Shire to Chiromo can be made either in steamers or in boats. The steamers take from six to eight days. When the river is high there is as much as 6 feet of water up to Chiromo, but from the end of July till November, when the river is low, 2 feet is the maximum depth of water in some places. In boats or canoes the journey takes from fifteen days, in the dry season, to a month in the wet. This is owing to the current being less in the dry season and the river being so shallow as to allow of the use of poles.

In June 1890, when I joined Mr. Johnston at Chinde, I made my first journey up the river in boats and canoes, and since then I have made the passage in steamers.

The River Chinde at the mouth is a fine broad stream, over a mile wide and from 30 to 40 feet deep. The ocean steamers can lie within 20 yards of the shore off the British Concession. About 3 miles up, the Chinde narrows suddenly to a creek about 100 yards in width, and is nearly of the same width up to the point where it issues from the main Zambesi, a distance of about 20 miles. About 12 miles from Chinde the Portuguese station of Sombo is passed. Here the Portuguese have a small dockyard for the repair of their river-gunboats, and some workshops with steam-saws and turning-lathes. They are also building a slip. Here also a Portuguese settler has a fine brick-house and plantation of some three hundred thousand coco-nut trees. Some of the latter are just coming into bearing, and the plantation, if well cared for, will ultimately, no doubt, form a source of great profit. From this point up to the junction with the Zambesi, are occasionally seen a few huts and gardens of the natives. When the main Zambesi is reached the ebb-tide will be found to be very strong, and it is almost impossible to paddle against it, but the flood-tide will carry up nearly another 20 miles in the dry season. Last March the Zambesi was so high that the current at Chinde, during the first three days I was there, was constantly running out. For many miles, after the Zambesi is entered, the banks are low and the country on both sides is swampy and with few trees. The

river is from 1 to 3 miles wide, and the numerous sand-banks and islands, which are constantly shifting, make navigation difficult; but



there is always a channel even in the dryest season, with from 3 to 4 feet of water, up to Vicenti.

Vicenti is an old Portuguese settlement on the north bank of the river, and is the place at which goods arriving from Kiliman by the Kwakwa were formerly shipped on the Zambesi. Mopea, the head of the navigation of the Kwakwa, is about 3 miles to the north of Vicenti. The goods were brought up the Kwakwa in canoes, and carried across to Vicenti by land. The African Lakes Company had a station here formerly, but it is closed, and all their transport work is now done direct from Chinde.

The Portuguese have a naval station at Vicenti, and there are one or two stores here. The Portuguese military commander lives at Mopea, where there is a telegraph-station on the main-line to Chiromo, while a branch-line connects it with Vicenti.

From Vicenti to the confluence of the Shire, a distance of about 30 miles, the channel of the Zambesi, in the dry season, is very winding, and it is sometimes difficult to navigate a boat drawing more than 2 feet of water. After leaving Vicenti the route usually used crosses the river to the right bank and passes close to Shupanga, where the Mozambique Company have recently established a station and custom-house, and then crosses back again to Masongwe on the left bank, about 10 miles above Vicenti. Here are a number of stores kept by Banyans and a few European traders, who generally have a supply of wood ready for passing steamers. The channel at the mouth of the Shire is rather deeper, but for the first few miles after entering the Shire it is somewhat difficult to find, as in some places the river broadens out and leaves sand-flats, on which the water is sometimes as little as 2 feet 6 inches. But after this the river deepens, and then as far as Pinda, passing the splendid mountain of Morambala, which rises to a height of 4000 feet above the sea-level, close to the left bank, there are no serious difficulties.

The Portuguese have a station at the foot of the Morambala Mountain under a military commandant. Here wood can be obtained, and provisions can usually be procured from the few scattered villages on both banks of the river.

Pinda is the outlet of the Morambala marsh, which in the wet season is almost a lake, but in the dry season is a swamp, traversed by the river in a number of deep narrow channels. Last year the usual course of the Shire at the exit from the Morambala marsh became blocked up with sand, and a new channel was formed through which the current flowed with such force that it was almost impossible to get the steamers up. It was in consequence found necessary to unload all goods going up the river, and to re-ship them above the obstruction.

At Pinda the branch telegraph from Sena joins the main line, and there is a telegraph office.

From Pinda, after passing the Morambala Marsh to Port Herald, there is an excellent but narrow channel. At Shuonga, on the left

bank, is a Portuguese custom-house, opposite which, on the right bank, is a notice-board, stating that this spot is the commencement of British territory. From this point, which is in lat. 17° 5′ 30″, the boundary line of British Central Africa runs due west to the water-parting of the Zambesi and Shire Rivers, and thence follows that water-parting to lat. 14° S. Shortly before reaching Port Herald are passed what have been aptly named the "S" bends, in which the curves are so sharp that it is almost impossible to get a steamer through without touching one bank or the other.

Port Herald, the first British station on the Shire, is situated on the right bank of the river about 30 miles below Chiromo. It is the chief station of the Lower Shire District, which includes all the British territory on the right bank of the Shire, below a line drawn due west from Chiromo. Here the Shire is bordered by a plain, which diminishes from 20 miles in width opposite Chiromo, to about 3 miles at Port Herald. Below Port Herald the plain widens out again, and forms the Morambala Marsh. In the Lower Shire District the northern slopes of the Matundu Hills are also included. These hills rise to about 2000 feet above the sea-level, and are the source of a number of small streams which dry up when they reach the plain above-mentioned. It is said that beds of coal are found in these hills, but up to the present time they have not been located, and there is considerable doubt as to their existence. Mr. Simpson, who has a station on the right bank of the river at Misangi about 6 miles above Port Herald, has a coffee plantation, which is said to be doing well on the upper slopes of these mountains. On the lower slopes and in the valleys and on portions of the plain there is a fine supply of timber suitable for boats and for house-building.

Above Mr. Simpson's station at Misangi the river becomes rather shallow, and for a month or two during the last dry season, steamers drawing more than 2 feet of water have had great difficulty in getting past. But as a rule, in the dry season, the water in the main channel is from 2 feet 6 inches to 3 feet, and in the wet season as much as 7 or 8 feet in depth.

II. The District of Chiromo.

Chiromo lies in the fork at the confluence of the Ruo and the Shire. The Shire here is about 70 or 80 yards broad, with a current of from 2 to 4 miles an hour, varying according to the season. The Ruo forms an estuary nearly 200 yards wide for the last mile before it reaches the Shire. On the left bank of the Ruo lies Portuguese Chiromo, where there are a military commandant and soldiers and a few trading stores. It is also the terminus of the telegraph-line from Kiliman.

At British Chiromo is the custom-house, where goods are cleared for British Central Africa. The ground has been laid out in streets and

plots, but as yet not many of them are taken up. As, however, trade increases, Chiromo must, from its position, become an important town. It is the nearest port for the Cholo and Milanji districts, where there are already a number of coffee-plantations. The native population in the neighbourhood is also considerable, and their wants will increase no doubt with the growth of civilisation.

Chiromo is the chief station of the "Ruo District." This district includes the country on the left bank of the Shire from the Maparara to the Ruo, and stretches back to the Luchenza and Tochila Rivers. On the right bank it embraces all the country up to the water-parting opposite the above-mentioned affluents of the Shire.

This country was formerly in the hands of Chipatula, a Makololo of Livingstone's Expedition, but is now under the sway of his two grandsons, MBengwa and Makwera, who govern it under the direction of the collector at Chiromo. There is, however, a small strip of country bordering the Ruo opposite, and below the Zoa Falls, under a chief Mlolo, who had lately (in 1890) moved over from the Portuguese side of the river. The district consists for the most part of the Elephant Marsh and the plains surrounding it. It also includes in the south the hills up to the water-parting of the Shire and Zambesi, of which little is known, and in the north the greater portions of the Cholo mountains and plateau. The Cholo Range forms the watershed between the Mpansi and Shire, and the Tochila and the Ruo, and forms a fine plateau, about 40 miles long and from 10 to 15 miles broad, with an elevation of from 2500 to 3500 feet. It is well watered by a number of perennial streams, and in many places the soil is excellent and suitable for coffee plantations. The plateau is not very thickly populated, there being but few villages and these generally small; the greater part of it is covered with forest, especially on the northern slopes towards the Tochila. The highest point, Mount Cholo, is a wooded knoll, rising from 200 to 300 feet above the surrounding plateau to a height of perhaps 4000 feet above sea-level. In places the valleys are most beautiful, the Raphia palm and various kinds of tree-ferns growing in and along the banks of the streams. Other places are covered with dense virgin forest, and furnish magnificent specimens of Mbela-trees, with straight stems running up to 60 feet and more, and measuring from 4 to 5 feet in diameter throughout, from which the native canoes are made.

Owing to its proximity to the river, the distance being only from 10 to 25 miles, this plateau will undoubtedly be soon taken up by planters. The rainfall here is said to be rather greater than in the Blantyre District. If this is the case its value as a planting district will be materially increased, but no definite measurements of the rainfall have as yet been taken. In October 1891 I travelled across the Cholo Plateau district from Zoa to Blantyre. Unfortunately I was

not in a good state of health at the time, and was unable to make any detailed survey of the route that I followed. After reaching the confluence of the Ruo and Tochila, I struck up the valley of the latter and followed it up to its confluence with the Swadzi.

The Swadzi flows through a deep rocky, but well-timbered, valley, with patches of excellent land along its course. After passing about 5 miles up the right bank of the Swadzi, the path crosses the river and ascends the hills to the north. I passed about 3 or 4 miles to the north of the wooded knoll which forms the highest point of the Cholo Range, and then followed the water-parting between the Mpansi and Tochila. Mr. Sharrer has cleared a road along this ridge from his Cholo plantations into Blantyre.

III.—From Chiromo to Chikwawa.

From Chiromo to Chikwawa, a distance of 45 miles as the crow flies, and about 70 miles by the river, a boat or canoe takes from three to five days to ascend, and from a day to a day and a half to descend. Steamers and lighters drawing more than 15 inches of water cannot get up in the dry season (from July till December); in the wet season, however, there is a depth of from 3 to 4 feet of water.

For the first few miles above Chiromo the river is broad, and in the dry season there are several dangerous sandbanks. For the next 20 miles the Shire flows through the Elephant Marsh, and is split up into several narrow and deep channels. The natives from the surrounding villages raise splendid crops of maize on the islands in the marsh, and also a little rice. The whole marsh is specially suitable for rice cultivation. Above the marsh the river passes through fine belts of palm-trees. About 50 miles above Chiromo, on the left bank, lies Makwera's village, where there is a considerable population. Makwera has three coconut-palms in his village which bear nuts every year; he has also a fair number of sheep and large herds of goats. This chief was for a short time at the mission at Blantyre; he can read and write his own language, and corresponds with the collector at Chiromo on the affairs of his district. About 10 miles higher up is the village of Masea, on the right bank, but before reaching this the confluence of the Maparara on the left bank is passed. This river forms the boundary between the West Shire District and Makwera's country. Mr. Sharrer has a station here from which he supplies his plantations on the Cholo Plateau. On the right bank before reaching Masea's the confluence of the Mwanza and Shire is passed, but I have never been able to locate this point exactly, owing to the numerous islands in the main channel of this river.

Masea is one of the Makololos left in the country by Livingstone. His chief remembrances of Livingstone are connected with the steam-

launch *Ma Robert*, of which he was stoker, and with a trip he made in her to the Johanna Islands. Masea is now the most important of the Makololo chiefs. His country, which is in the "West Shire District," lies on either side of the Shire, on the left bank between the Mpansi and Maparara streams, running back to the hills, and on the right bank extending across the Mwanza Valley to the water-parting between the Zambesi and Shire. Both on the Shire and the Mwanza the country is fairly thickly populated. At a spot about a day's journey west by south-west from Masea's, there are some salt-pans from which large quantities of salt are obtained. Opposite Masea's village, on the left bank, the Blantyre Mission have lately opened a station in connection with their steamer on the river.

About 5 miles further up on the left bank is the station of the African Lakes Company and the village of Katunga. There is also a station of Mr. Sharrer's here.

The African Lakes Company's steamers land their cargo for Blantyre at Katunga. The Government station is at Chikwawa, about 2 miles further up on the same bank, where Mr. Buchanan has a plantation.

IV. The West Shire District.

Chikwawa is the headquarters of the officer in charge of the West Shire District, and also the station where goods are landed for Blantyre. The district lies on both sides of the river. On the north it is bounded by the Mukurumadzi River, on the west by the water-parting of the Shire and Zambesi, and on the south by a line drawn from the confluence of the Mwanza and Shire to the water-parting. On the east of the Shire this district extends to the edge of the high plateau from opposite the confluence of the Mukurumadzi and Shire to the Maparara stream.

The West Shire District has a general elevation of from 800 to 2000 feet above the sea-level. On both sides of the river are very fertile plains, and the Valley of Mwanza is wonderfully rich, and is thickly populated. The country between the Shire and Mwanza, which consists of a series of low ridges of hills, is absolutely waterless in the dry season, and the district to the south of the Mwanza is of a similar nature. At the same time the soil is fertile, and in the wet season the natives penetrate into the interior considerable distances from the river, and make gardens, which bear heavy crops of kaffir-corn. These crops are reaped at the end of the wet season, and the gardens are then deserted for the rest of the year.

Last September I made a journey across this country to an important village called Mikolongo, where the Central African Company have a station. I started in a canoe up the Shire from Chikwawa. The Shire is easily navigable for steamers 4 miles above Chikwawa, up to the

confluence of the Likabula. Just above this point a ridge of rocks runs across the bed of the Shire, and caused slight rapids. The fall is not very great, even in the dry season, and it is always possible to get canoes and small boats up the rapids by poling. In the wet season steamers can pass. Above these rapids the river is quiet, though rather shallow in places in the dry season. Chirala, the village of Mbula, is about 6 miles above the rapids on the left bank. Here I learnt that the next rapids do not occur for nearly a day's journey (about 12 miles), up to which point one can travel in a canoe; but, much to my regret, I could not spare time to visit them.

Chirala is a large village, and there is a considerable population. Probably there are over two thousand people in this and the surrounding villages. Mbula has a small herd of cattle, but they do not seem to flourish, possibly from neglect, as there does not appear to be any tsetse fly in this district. Goats and sheep are fairly abundant.

On leaving Chirala I crossed the river, and marched about 4 miles up the right bank to Nchuali, the village of Mlauri.

Mlauri was formerly head chief of the Makololo, in succession to Ramakukan, but was deposed after his defeat by the Portuguese expedition under Serpa Pinto. He is still, however, held in considerable respect, and is consulted in all important matters of state by the young chief of Chirala. He is very intelligent, and a fine-looking old man, and was much pleased to have a talk about Livingstone and his former journeys with the great traveller.

From Nchuali I marched about 5 miles west, to a small village called Manchombi, where there was a well in the bed of a dry stream. All the intervening country was extremely arid, and covered with scrubby forest. We had a 20-mile march before us from this place to the Mwanza, with absolutely no water on it, so we started at 3 a.m. to avoid the heat of the day. We reached the Mwanza at a village called Bengera about 11 A.M. From here I went on by Nyamuka to Mikolongo, where I stayed a day with M. Foa, an agent of the Central African Company. Mikolongo is a large village of nearly two hundred huts, and lies on the right bank of the Mwanza just below its confluence with the Gombedzi River. The Mwanza is here a considerable stream even in the dryest season; it is from 12 to 15 feet wide, and from 1 foot to 9 inches deep, with a current of from 4 to 5 miles an hour. In the wet season it is a very large river. From Mikolongo I followed the river down the right bank to Katawala, where I crossed to the left bank. Between these places the river-bed is from half a mile to a mile wide, and lies between banks about 20 feet high on either side. Below Katawala the river-valley widens out into marsh, which, I believe, eventually joins the Elephant Marsh of the Shire.

In the bed of the river and in the marsh rice is extensively cultivated, while Indian corn is planted by the natives every fortnight, so

that they may always have the luxury of green corn. Kaffir corn is grown during the wet season on the banks on both sides. The population on the Mwanza is thick for Africa. I myself saw more than fifteen villages in the 10 miles between Mikolongo and Katawala, and I counted nearly one thousand houses in them, besides hearing of many others which I did not visit. The people are of a lazy and less prosperous type than those on the Shire. Their country is so fertile that they live with greater ease, and they have learnt from the Portuguese half-castes the art of distilling ardent spirits, in which they indulge considerably. It is extremely difficult to get men either to work or to carry loads. Game is very abundant in the hills on both sides of the Mwanza. Water-buck, eland and hartebeest are especially plentiful. On the hills to the south is found the Bō Antelope (*Trogelaphus angasi*) in considerable numbers. Zebras, buffaloes, koodoos and bush-bucks, are also plentiful; and rhinoceroses and elephants are occasionally met with.

From Katawala after crossing the river I kept along the left bank of the marsh for some distance, passing through several villages, and then struck across the low hills direct to the Shire, which I reached opposite Mulilima's village.

Owing to its low elevation the West Shire district is not adapted for European habitation, but it is well-suited for raising tropical products, such as rice, oil-seeds, cotton, Indian and Kaffir corn, indigo and opium. The first five of these products are already plentiful, and doing extremely well. In the opinion of men who have been engaged in the indigo and opium industries in India this district is especially well suited for them. Sugar and tobacco also flourish, and might likewise prove worth development commercially, as soon as cheaper transport is instituted.

V. From Chikwawa to Blantyre.

This is a route well known and has often been described. A road was first made between these places by the combined Scotch and Free Church Missions, under the direction of Mr. Henderson, C.E. This road has been altered by the African Lakes Company at various times, but it has never really been fit for wheeled traffic. The total rise is about 3000 feet in 26 miles, but as Mbami is about the same height as Blantyre this makes the rise 3000 feet in the first 14 miles. The most difficult places on the road are the first rise from the plain up to Makoka, and the second rise at the edge of the plateau up to Mbami. Here in making the road suitable for wheeled traffic it has been found necessary to introduce zigzags, and by these means I was able to secure a maximum gradient of 1 in 15. The road follows the water-parting of the Mpansi and Likabula Rivers nearly the whole distance, and thus has not involved much heavy work except on the above-mentioned hills. In forming the

cuttings on the Mbazo hill below Mbami, a few good sections were made showing the geological formation of this part of the country to be sandstone. The sandstone is of a white, hard, crystalline sort, metamorphosed and almost quartzite in places; no intrusive dykes were observed, although I should say they must exist. The surface of the hill is covered with immense quantities of *débris*, consisting of sand and clay mixed with round boulders of blue basalt, which vary in size from pebbles up to blocks of many tons in weight. I could find no traces of glacial action. Mr. Boyd, who was employed looking after the working parties, had had considerable experience in mining in other countries, and although he reported that the formation looked most favourable for minerals, he was unable to find traces of gold or any other ores either *in situ* or by washing in the surrounding streams.

VI. The Blantyre District.

This is at present the most highly developed district of the Shire Highlands. Blantyre is the headquarters of the Church of Scotland Mission, of the "African Lakes Company," of Mr. Sharrer and of several other traders and planters. Mr. Buchanan has plantations at Michiru Lunzu and Mbami. Altogether there are eighteen plantations here belonging to ten different owners with a total acreage of 1300 acres.

Mr. Buchanan also grows and manufactures tobacco and cigars for local consumption. Tea and cinchona are being tried and grow well, but have not yet been cultivated in sufficient quantities to be commercially valuable.

The Blantyre district lies almost entirely on the plateau, but stretches down to the river opposite the Murchison Cataracts and up to Matope. As a whole the soil is not so fertile as in the Cholo district, and the rainfall appears to be a little less; it averages about 50 inches in the year.

There is a considerable native population around Blantyre, chiefly Yaos. The country was formerly owned by three chiefs, Kapeni, Chimtengi and Chejoi: the last two are now dead and are represented by men who have practically lost all power. Large portions of the land are now in the hands of Europeans, having been bought from the above chiefs for planting purposes. To the north-west of Blantyre near the Shire is a range of limestone hills, whence lime is procured for building at Blantrye. I never had an opportunity of visiting this place. The limestone is brought in by the natives: it is a hard, pure, white crystalline marble burning to a fat white lime, which forms fair mortar and excellent whitewash. At Mount Mpingwi to the east there are deposits of white china clay, which is also brought to Blantyre by the natives, and is used for whitewash.

VII.—From Blantyre to Milanji.

This is a distance of about 50 miles, and the journey takes from two to three days according to what part of the district it is required to reach. Leaving Blantyre the path follows an east-south-east direction, and after crossing several streams of the Mudi and passing a flourishing coffee-plantation of Mr. Duncan's, reaches at a distance of about 4 miles Mr. Lindsay's plantation, which lies on the water-shed between the Tochila and Mpansi. It then crosses the Luchenza and passes between the mountains Bangwi and Malabvi.

On the north slopes of Malabvi there is a large scattered village, and the inhabitants have large gardens. After crossing the Chombezi the path keeps on through broken country to Midima, a small village which lies on the northern slopes of the hill of that name. This village is 20 miles from Blantyre, and is the usual half-way house. From Midima to Milanji the path crossed the Tochila plain, which is almost flat, and lies at a height of 2000 feet above sea-level. Twelve miles from Midima the Tochila is reached. The river flows between banks about 20 feet high and from 100 to 150 yards apart. In the dry season it is easily passable in most places, but after rain it rises to from 10 to 15 feet, and becomes an impassable torrent. Dr. Scott, of the Blantyre Mission, has built a light timber bridge over it for foot traffic, which is a great convenience in the wet season, but a new bridge will have to be constructed when the road is completed from Blantyre to Milanji. This road is now being constructed to take wheeled traffic by Mr. John Moir, who has undertaken the contract for the British Central Africa Administration. From the Tochila to Milanji the path continues over the plain until it descends into the valley of the Likabula River, which it crosses by another wooden bridge. After this one path ascends the lower slopes of the Milanji Mountain to the Mission station, while another continues southwards along the foot of the slopes to the station of the British Central Africa Administration beyond Chipoka's, a distance of about 10 miles.

VIII.—The Milanji District.

This is the most easterly district in the British territory. It lies all around the great mountain Milanji, extending to the south as far as the Ruo and Tochila Rivers, and to the north up to Lake Shirwa. The country round the base of the mountain is a fairly level plain, of an elevation of about 2000 feet above the sea. From the plain the country gradually rises towards the mountain to a height of about 3000 feet, forming the lower spurs, and from this foundation the mountain rises another 3000 feet in abrupt cliffs, only broken in the places where the larger streams flow down. This rampart of cliffs borders the upper

Scottish Provident Institution

INSTITUTED 1837. INCORPORATED 1848.

IN THIS SOCIETY are combined the advantages of **Mutual Assurance** with **Moderate Premiums.**

THE PREMIUMS are so moderate that an Assurance of £1200 or £1250 may generally be secured from the first for the yearly payment which usually would be charged (with profits) for £1000 only—equivalent to an immediate Bonus of 20 to 25 per cent.

The WHOLE PROFITS go to the Policyholders, on a system at once safe and equitable,—no share being given to those by whose early death there is a *loss*. Large additions have thus been, and will be, made to the policies of those who participate, notwithstanding the lowness of the premiums.

The SURPLUS at last Investigation (1887) was **£1,051,035,** which, after reserving one-third, was divided among 9384 Policies entitled to participate. First additions (with few exceptions) ranged from 18 to 34 per cent, according to age and class; and policies which had shared before, were increased in all 50 to 80 per cent.

Next Investigation with Division of Surplus takes place as at close of 1894.

Fully **two-thirds** of the amount of **Claims** paid last year was in respect of Policies which had participated in the Surplus—the **Bonus Additions** averaging almost **50 per cent** of the original Assurances.

The Accumulated FUNDS now exceed 8¼ MILLIONS.

Their increase during last year was £324,944.

Arrangements as to SURRENDERS, NON-FORFEITURE, LOANS ON POLICIES, EARLY PAYMENT OF CLAIMS, FREE RESIDENCE, &c., are specially liberal.

REPORTS *with full information may be had on application.*

For Table of Premiums, by different modes of payment, see the other side.

LONDON OFFICE: 17 KING WILLIAM STREET, E.C.

HEAD OFFICE: No. 6 ST. ANDREW SQUARE, EDINBURGH.

Oct. 1893.

Scottish Provident Institution.

TABLE OF PREMIUMS, BY DIFFERENT MODES OF PAYMENT,

For Assurance of £100 at Death—With Profits.

Age next Birthday.	Annual Premium payable during Life.	ANNUAL PREMIUM LIMITED TO			Single Payment.	Age next Birthday.
		Twenty-one Payments.	Fourteen Payments.	Seven Payments.		
21	£1 16 3	£2 10 6	£3 4 11	£5 10 0	£33 0 1	21
22	1 16 9	2 11 0	3 5 9	5 11 0	33 5 10	22
23	1 17 2	2 11 6	3 6 5	5 12 1	33 11 2	23
24	1 17 7	2 12 1	3 6 11	5 13 1	33 16 5	24
25	1 18 0	2 12 6	3 7 3	5 14 0	34 2 0	25
26	1 18 6	2 13 0	3 7 10	5 14 11	34 8 2	26
27	1 19 2	2 13 6	3 8 7	5 15 11	34 16 1	27
28	1 19 11	2 14 1	3 9 5	5 17 1	35 4 9	28
29	2 0 8	2 14 8	3 10 3	5 18 6	35 14 1	29
*30	2 1 6	2 15 4	3 11 2	6 0 1	36 4 0	*30
31	2 2 6	2 16 2	3 12 1	6 1 10	36 14 6	31
32	2 3 5	2 17 1	3 13 2	6 3 8	37 5 5	32
33	2 4 6	2 18 0	3 14 4	6 5 8	37 17 2	33
34	2 5 7	2 19 0	3 15 7	6 7 9	38 9 7	34
35	2 6 10	3 0 2	3 16 11	6 10 0	39 2 9	35
36	2 8 2	3 1 5	3 18 4	6 12 5	39 16 11	36
37	2 9 8	3 2 9	3 19 11	6 15 0	40 12 4	37
38	2 11 3	3 4 3	4 1 7	6 17 9	41 8 7	38
39	2 12 11	3 5 9	4 3 4	7 0 7	42 5 4	39
†40	2 14 9	3 7 5	4 5 2	7 3 7	43 2 10	†40
41	2 16 8	3 9 2	4 7 2	7 6 8	44 0 11	41
42	2 18 8	3 11 1	4 9 3	7 9 11	44 19 9	42
43	3 0 11	3 13 1	4 11 5	7 13 3	45 19 3	43
44	3 3 3	3 15 3	4 13 10	7 16 9	46 19 7	44
45	3 5 9	3 17 6	4 16 4	8 0 7	48 0 8	45
46	3 8 5	4 0 0	4 19 1	8 4 6	49 2 8	46
47	3 11 5	4 2 8	5 2 1	8 8 8	50 5 8	47
48	3 14 8	4 5 8	5 5 4	8 13 2	51 9 7	48
49	3 18 1	4 8 9	5 8 9	8 17 11	52 14 1	49
50	4 1 7	4 12 1	5 12 4	9 2 10	53 19 3	50
51	4 5 6	4 15 5	5 16 1	9 7 11	55 4 5	51
52	4 9 5	4 18 10	5 19 11	9 13 1	56 9 0	52
53	4 13 5	5 2 5	6 3 11	9 18 3	57 12 11	53
54	4 17 8	5 6 3	6 8 0	10 3 5	58 17 2	54
55	5 1 11	5 10 2	6 12 1	10 8 6	60 0 8	55

[The usual *non-participating* Rates of other Offices differ little from these Premiums.]

* A person of 30 may secure £1000 at death, by a yearly payment, *during life*, of £20 : 15s.
This Premium would generally elsewhere secure **£800** only, instead of **£1000**.
OR, he may secure £1000 by 21 yearly payments of £27 : 13 : 4—*being thus free of payment after age* 50.

† At age 40, the Premium *ceasing at age* 60 is, for £1000, £33 : 14 : 2,—about the same as most Offices require during the whole term of life. Before the Premiums have ceased, the Policy will have shared in at least one division of profits. To **Professional Men** and others, whose income is dependent on continuance of health, the limited payment system is specially recommended.

BRANCH OFFICES:

GLASGOW, 29 St. Vincent Pl.
ABERDEEN, 25 Union Street.
DUNDEE, 12 Victoria Chambers.
BIRMINGHAM, 95 Colmore Row.
BRISTOL, 31 Clare Street.
CARDIFF, 19 High Street.
LEEDS, 35 Park Row.
LIVERPOOL, 25 Castle Street.
MANCHESTER, 10 Albert Sq.
NEWCASTLE, 1 Queen Street.
NOTTINGHAM, 27 Victoria St
BELFAST, 10 Donegall Sq., N.

DUBLIN . . . 16 COLLEGE GREEN.

LONDON OFFICE: 17 KING WILLIAM STREET, E.C.

Printed by R. & R. CLARK, *Edinburgh.*

plateau of Milanji, about 6000 feet above the sea-level, which is of considerable extent, though split up into various portions by deep ravines and precipices. In the centre of this plateau the peaks rise another 3300 feet, making a total height of 9300 feet.

The plain around the base of Milanji to the south and east is broken and hilly, being abundantly watered by perennial streams from the mountain. It is extremely fertile, and the forest is the finest I have seen in this part of Africa. The rainfall is apparently heavier in this district than in any other place in the Shire Highlands.* There is rain throughout the year and a month never passes without a few showers. In the wet season rain is heavy and constant. Several plantations have been started, and the coffee-plant appears to flourish, but as yet has not reached maturity, so it is impossible to say what the crop will be.

Towards the west the plateau is dry and poorly forested, with open grass plains in some parts. In certain places game of all kinds swarms, especially around the marsh formed by the Tochila stream. The lower slopes of the mountain here are fairly well watered, and land has been taken up in two or three spots to start coffee-plantations. But the rainfall is not nearly so heavy as at the east end of the mountain, and for several months in the dry season there is no rain, as is the case in other parts of the Highlands.

The northern slopes are equally well watered and fertile, the natives raising large crops. In November 1891, when I came to Milanji from Zomba, there was a severe famine, both at Zomba and Blantyre, owing to the short crop that year.† Yet at Milanji food was fairly plentiful, as owing to the more constant rainfall the new crops were already nearly ripe, and in some few places were actually being gathered.

All the lower slopes of the mountain are suitable for coffee, and as the present population is not very large or very industrious there is ample room for plantations. To the south as far as the Tochila and Ruo are areas of splendid forest-land suitable for coffee and other tropical products, and I have no doubt that Milanji will eventually become a most thriving coffee-planting centre and one of the most prosperous agricultural districts in British Central Africa.

The population around the mountain consists of Yaos, Manganja and Alolo. Mabuka in the south is now the Manganja chief in the place of the late Chipoka. To the west are Chingomanji, Namonde, MKanda, and Kada, all Yaos; to the north are Nazerara and Bonga, both Alolo, while to the east are Kumtiramanja and Matapwiri, Yaos again. On the upper plateau there is no permanent population, but the

* Since returning, I have heard from a planter that the rainfall for the year ending June 1893 was 80 inches.

† The natives never plant more than they expect to eat themselves, so that if there is a partial failure there is sure to be a famine.

Manganja go up there in the dry season to procure salt from the "Everlastings," which grow there in great profusion. They make the salt by burning the plants and washing the ashes. They then evaporate the water from the brine by boiling it in pots. Salt is also made in this fashion in the Shirwa plains, where certain reeds contain large quantities of salt.

From the lower spurs of Milanji to the upper plateau there are several routes. The easiest is one from the Administration Station round the south-east corner of the mountain and up a side valley of the Luchenia River.

In November 1891, when I visited the plateau, I ascended by this route. From the Administration Station the path ascends the first 1500 feet by grass-covered spurs, passing at first numerous native huts and gardens. At about 4000 feet above the sea-level it enters a band of forest, which at this spot hangs on the upper slopes of the mountain. On the south face the cliffs are almost perpendicular and show a surface of bare rock. The path ascends about 1000 feet through this forest, crossing numerous streams. The vegetation is most luxuriant; tree-ferns and creepers abound, many of the latter belonging to species which produce india-rubber. From the forest the path emerges into a more open valley varied with dense thickets of bamboos and underwood; up this it gradually winds, the vegetation becoming less and less, till it changes to open grass with patches of bracken, and finally reaches the edge of the plateau. Here a splendid scene lies before the spectator; at his feet are rolling grass hills interspersed with patches of forest which show where the streams rise, in front, at about 2 miles distance, the valley of the Luchenia stream, which leaves the plateau through a splendid wooded gorge on the right. Beyond it rises the magnificent forest of cedars (*Widdringtonia whytei*) placed on the lower slopes of the peaks, which tower up another 3000 feet in front of him. This portion of the plateau has an area of about 10 miles by 5, and in it rise the streams which make up the Luchenia, a most important tributary of the Ruo. These rise on the western half of the plateau; some of them join together and form the main stream of the Luchenia which flows to the east, while others flow direct over the edge of the plateau, and forming splendid water-falls join the main stream on the plain below. The Ruo rises in an independent plateau to the east of the main peak, which has not as yet been visited by any European, and the Tochila and Likabula rise on similar plateaus to the north-west, divided from the main plateau and from each other by rocky spurs, which run out from the western slopes of the peak.

The Milanji plateau has been compared to Newera Eliya in Ceylon and other similar health-resorts in India. The climate is delightful; the atmosphere being fresh and bracing, and most refreshing after the hotter atmosphere of the plains below. As soon as the road has been

completed it is intended to build a sanatorium here, and the Blantyre Mission and several private individuals have already taken up blocks of land for this purpose. The British Central Africa Administration are taking measures to protect the forests, especially the cedars, which have suffered much from fires, and it is hoped that they will form a valuable supply of timber for the use of the country, if properly preserved and replanted.

As this plateau is the highest ground n this part of Africa available for a station, I have no doubt that as soon as communication is established it will become an important health-resort for all the surrounding districts.

A contract has been made by the Administration with a local planter for the construction of a road from the Administration Station to the Upper Plateau. This road is to be 8 feet wide with a maximum gradient of 1 in 6, and will be available for donkeys and light carts. A saw-mill is also being constructed on the plateau, to supply the excellent soft-wood timber which is so much required in the surrounding districts. As already stated, communication with Blantyre is also being opened, and a road to Chiromo by the Zoa Falls is in course of construction.

IX.—Chiromo to Milanji.

This route will eventually be one of great importance, as it is the easiest road by which Zomba and Milanji can be reached from the Lower Shire. The Ruo forms a break in the edge of the plateau, up which a railway could be made with fairly easy gradients. From Chiromo to Gandi, a distance of about 6 miles, the road is perfectly level, passing through well-timbered country along the right bank of the Ruo, across the alluvial plain of the Shire River. At Gandi the lower edges of the hills are reached, and up to this point the Ruo is navigable for light canoes, but from here to its source there is a succession of pools, rapids and waterfalls. From Gandi to Mlolo's, a distance of 7 miles, the road passes along the foot of the hills which gradually rise in height. The path cuts off bends of the river in places, and crosses a number of dry water-courses. This portion of the route could easily be made suitable for waggon traffic. Mlolo's is a considerable village with extensive gardens, in the bed of the river, and along the bottom of the valley on the right bank. Above Mlolo's to Zoa the river flows in a deep valley with steep slopes on either side, covered with bamboos and fine forest. The old path led along this valley and was extremely difficult, being impassable when the river was in flood. A new path has been opened direct from Mlolo's to Zoa, cutting off the bend of the river, and the road, when made, will follow this route. The path crosses several streams and ridges, but is considerably easier than the old one, and is at present

suitable for pack donkeys, though a few bridges would greatly improve it. At Zoa a small portion of the road has been constructed, but its continuance has been stopped for the present, owing to the impossibility of getting sufficient labour to carry on this and the Chikwawa-Blantyre road at the same time. The Ruo at Zoa falls about 150 feet, 100 feet of which is a single fall from a ledge of rock into a deep chasm. I have only seen these falls in the dry season, but even then they are a fine sight, and in the wet season they must be splendid. Above the falls the river is from 50 to 100 yards wide, and its bed is full of rocks and islands. The falls are caused by a basalt dyke which runs directly across the bed of the river. In the dry season the water flows chiefly in a narrow channel in the centre of the dyke, and after falling down about 50 feet in broken streams, collects itself and makes a final plunge into a narrow chasm of fully 100 feet. Below the chasm opens out into a glen with steep sides, clothed with fine forest. The river flows out of the chasm into a sandy pool, where a crocodile or two may generally be seen on the sand. It then flows down the glen filling up almost the entire bottom, and in the wet season rising considerably up its sides. Hippopotamuses in considerable numbers frequent the pools along the river, both above and below the falls. There is a fine supply of timber on the hills near Zoa, and all along the river valley between Zoa and Mlolo's.

Just above Zoa Mr. Buchanan is trying the experiment of a coffee-plantation to see if the coffee will flourish at so low a level as 1500 feet. It has been started rather more than a year now, and the plants look extremely flourishing. While the hills behind Zoa are rather stony and the soil poor, near the Ruo and in some of the valleys of its affluents the ground is extremely rich, and this would be a very suitable locality in which to try an experimental plantation of cocoa.

From Zoa to the confluence of the Ruo and Tochila the road will follow the river bank. In a few places a little construction and perhaps even blasting will be necessary, but as a rule the valley is open, and a road could be carried along it without much expense. Above this the valley of the Ruo becomes still more open, and a few miles after crossing the Tochila a road could easily be made in any direction required. The present path leaves the Ruo and makes a bee-line for Chipoka's, crossing the Likabula just below its confluence with the Mlodza, and so on to the Administration Station of Milanji.

X.—Milanji to Zomba.

At present there is no direct road or path between Milanji and Zomba. The usual route is round the east end of Milanji by Mount Cheza and Machemba Hill to Nazerara's, across the plain to the Likangala, and up the valley of that river and the Mlungusi to the Residency, which lies on

the right bank of the latter stream at the foot of the mountain. Another route is to follow the Blantyre road to Midima and go thence to Chiradzulu where the Blantyre-Zomba road is joined. A road could easily be made direct. In November 1891 I travelled from Zomba to Milanji, making a straight line from the Residency to the south-west corner of Milanji, and although we had some difficulty in places owing to the thick jungle, there would be absolutely no difficulty in making a road on this line.

As the country develops Mr. Johnston intends to open a direct road from Chiromo to Zomba, which, after following the Ruo up to its confluence with the Tochila, will strike straight across to the point where the Blantyre-Milanji road crosses the Tochila. From this point it will run direct to Zomba, and will thus form a fairly direct route from Zomba to Milanji, as well as from Zomba to Chiromo.

XI.—The Zomba District.

This district consists of the Zomba Range and the country to the east and south as far as Lake Shirwa and the Palombe and Mombezi rivers, and includes Chiradzulu.

The chief population is settled on the slopes of Zomba and Chiradzulu and the plain towards Shirwa, the plateau between the above-mentioned mountains being uninhabited. The chiefs and majority of the people here are Yaos, but there is a remnant of Manganjas, to whom the country formerly belonged, held in servitude. On Zomba the chiefs are Kowinga, Milemya, and Chemlumbi, and on Chiradzulu, Kumpama.

The Residency of Zomba, the headquarters of the British Central Africa Administration, lies on the south-east slopes of Mount Zomba, close to the Mlungusi stream, and, therefore, in the watershed of Lake Shirwa, at a height of 2970 feet above the sea-level. Mr. Whyte, the scientific officer of the Administration, has his headquarters here, and carries on experiments in economic botany in the garden and surrounding grounds. He has successfully cultivated all the common European vegetables, and has planted avenues of many varieties of conifers, and other useful and ornamental trees, which are in a most flourishing condition.

At present coffee has been tried only on the south-eastern and southern slopes of Zomba, and although the plant grows well it sometimes suffers severely from the hot winds which blow up from the Shirwa plains. All the lower slopes of the mountain between the altitudes of 2500 and 3500 feet appear to be suitable for coffee cultivation.

Mount Zomba is flat-topped; its upper plateau lies at an elevation of from 4000 to 5000 feet. There is no very distinct peak. On the south the edge of the plateau rises to over 5000 feet, forming the highest

point, and again on the west the land rises to nearly the same height. I have ascended the mountain from the Residency. The plateau on the top is very similar to the plateau on Milanji, but there is not so much forest and there are no cedars. The greater part is open downland; in the valleys there are large patches of bracken. A fair number of bush-bucks are met with on the plateau, and I have seen traces of leopards and pigs. There are no human inhabitants at the present time, but formerly, before the Yao invasion, there was a large population settled in the upper valley of the Mlungusi, and traces of their villages still remain.

On the south of Zomba a plateau of about 3000 feet elevation stretches towards Chiradzulu, dividing the plains of the Upper Shire from those of the Shirwa watershed. This strip of country is well forested and watered, being traversed by numerous perennial streams, and will undoubtedly in future become valuable land for coffee plantations.

Chiradzulu is a striking mountain rising to a level ridge about 2 miles long, which runs north and south to an elevation of nearly 5000 feet. There is a large native population on its lower slopes settled in numerous small villages. The upper slopes are well forested and watered by numerous small streams.

XII.—Zomba to Mpimbi.

The road from the Residency at Zomba to Mpimbi on the Upper Shire passes round the south end of the mountain. After leaving the Residency it skirts the lower spurs of Zomba into the valley of the Likangala, which it thence ascends. At the head of this valley it crosses the watershed, and descends the steep escarpment of the plateau to the Upper Shire plain, making a fall of about 1500 feet. To form a road for carts down this escarpment will be a matter of some difficulty, but the rest of the route is comparatively easy. From the foot of the escarpment the road runs in a direct line to Mpimbi. The total distance from the Residency to Mpimbi is about 20 miles.

Mpimbi is the port of Zomba on the upper river, and is in direct water-communication with Lake Nyasa. From Mpimbi regular boats run to Fort Johnston with mails and stores.

XIII.—The Upper Shire District.

This district consists of the plains on both banks of the Shire River, from above Matope to within a short distance of Lake Pamalombe, and includes the countries of Liwondi, Kupimbi, Genasu and Mitawa. On the left bank of the river above Mpimbi the spurs of Mount Zomba

reach down to the river, forming hills of limestone, from which is procured lime for building in the Zomba and surrounding districts. The limestone is similar to that of the Blantyre District. The soil of this district is extremely fertile, and on both banks of the river large crops of rice, Indian corn and Kaffir corn are grown by the natives. The general altitude of the plain is about 1500 feet above the sea-level, and much of it is marshy and rather unhealthy for Europeans, but it will always be a district where large quantities of cereals can be raised by the natives. Many parts of it are finely timbered, and in the uninhabited parts there is a great abundance of game. Water-bucks, zebras buffaloes and bush-bucks are found in large quantities, while the koodoo the mpala, and the hartebeest are also plentiful.

Mpimbi was formerly the head station of this district, but, since the late disturbances at Liwondi's, a new station and fort have been formed at the latter place, and that will probably be made the head-quarters. Mpimbi will always, however, be an important place as the port of Zomba and probably of Blantyre. Matope, the present forwarding station of the African Lakes Company, although 10 miles nearer to Blantyre, is surrounded by marshes, and can only be reached in the wet season by a road which for nearly 2 miles is knee-deep in water. It is in consequence rather unhealthy. Mpimbi is also the nearest point to Blantyre, where the hills run down close to the river's edge and where a fairly healthy station can be placed.

A direct road is being cleared to connect Mpimbi with the Blantyre-Matope road where it crosses the Lilangwi. Unfortunately the plain lying to the east of the river is infested with the tsetse fly, and cattle cannot be used for transport over this part of the road.

XIV.—From Mpimbi to Fort Johnston.

This is a distance of about 60 miles in a straight line, but the course of the river takes nearly 90 miles. From March till August the river is navigable for vessels drawing 5 feet 6 inches, but during the remainder of the year when the river is low, there are places with as little as 3 feet of water. Above Mpimbi the left bank of the Shire is bordered by the hills which form the lower spurs of Mount Zomba. The current is about 2 miles per hour, and the river from 100 to 150 yards wide. At the village of Kusapa the water becomes rather shallow, and the bed of the river stony. This forms an obstacle to navigation in the dry season, vessels drawing more than 3 feet of water being unable to pass. A short distance higher up, the hills on the left bank recede and the river widens, forming sand-flats. Here the channel in the dry season has only 3 feet of water. From this point up to Lake Pamalombe, the banks on either side are as a rule low, but the river forms a fairly good

channel. Both banks of the river are pretty thickly populated, the chief town passed being Liwondi's, about 40 miles by river above Mpimbi. At Liwondi's there are a number of coastmen settled, and until lately the slave trade was rife, but since the disturbances in March last, a fort has been built on the left bank opposite this village, and slave-trading is stopped for the present.

Above Pamalombe the shores of both the lake and the river are almost entirely uninhabited, owing to the constant slave-raiding which formerly took place in this neighbourhood.

Lake Pamalombe is about 15 miles long, and from 10 miles to 12 miles across. On the west it is fringed by hills, but on the east the country is flat, and the banks are extremely swampy. The water for the most part is shallow; the bottom consists of deep mud, into which a pole can be pushed 10 feet without finding any bottom. There are deeper channels which follow the line of either shore. At the north end, where the river enters, it forms a mud bank, and at times, in the dry season, this blocks the navigation for vessels drawing over 3 feet of water.

The river above Lake Pamalombe is from 100 yards to 150 yards wide, with plenty of water. The distance to Fort Johnston by it is about 15 miles, as it winds considerably. At Fort Johnston, which is situated on the left bank opposite Mponda, the river widens to between 300 yards and 400 yards, and from here to Lake Nyasa it gradually widens, forming a deep bay at the south end of the lake about 5 miles from the fort. There is a sand bar across this bay which sometimes blocks the river for steamers drawing 6 feet of water; but as a rule the bar is passable, and the steamers can come down to the fort.

XV.—The South Nyasa District.

Fort Johnston is the head station of the Nyasa District, which comprises all the country round the south-eastern arm of the lake, and includes the territories of Mponda, Makandanji, and Serafi. Mponda's country lies on the west side of the Shire, and is bounded on the west by the Angoni, on the north-east by the lake and River Shire, and on the south by Liwondi's country. Mponda himself is a Yao, and his subjects are a mixture of Yaos and Manganja. His chief town lies on the right bank of the Shire, opposite Fort Johnston, and is surrounded by a stockade. To the north of it, along the river bank, lie several more large villages. Makandanji's and Serafi's countries are on the east of the lake and River Shire, and at present are in a rather unsettled state. The land along the banks of the Shire, and on the shores of the lake, is extremely fertile, and suitable for the cultivation of all tropical products. Although Fort Johnston lies low, and is surrounded with marshes at the back, it has proved to be a fairly healthy station for

Europeans, and it seems to suit the Sikhs, who are quartered there, very well.

This completes the description of the districts of Southern Nyasaland, with the exception of that of the Southern Angoni, which lies to the south-west of Mponda's country, and is partially within the Portuguese sphere of influence, although their chief, Chikusi, has made a treaty with Great Britain, and our relations with him are extremely cordial. A resident has not yet been sent up to this country.

Lieutenant Sclater's Map.—This map is compiled from compass bearings taken by Mr. Sclater, but as he took no astronomical observations, it is based on the positions of Katunga (16° 5′ S. lat., 34° 51′ 18″ E. long) and Chiromo (16° 30′ 57″ S. lat., 35° 9′ 30″ E. long.) taken by Commander Keane in 1893; on that of Blantyre (15° 47′ 30″ S. lat., 35° 3′ 54″ E. long.) by Commander Keane and Consul O'Neill, and of Zomba by Mr. Last in 1886 (15° 25′ S. lat., 15° 21′ 30″ E. long.).

THE DETERMINATION OF GEOGRAPHICAL LONGITUDES BY PHOTOGRAPHY.

By HENRY G. SCHLICHTER. D.Sc.

Mr. Coles, in an admirably-written paper, which he read at the meeting of the British Association at Cardiff, has critically compared the respective values of the different astronomical methods for the determination of longitudes. Occultations take the first place as regards accuracy, whilst, as Mr. Coles points out, lunars as well as the eclipses of Jupiter's satellites are much less reliable. Lunar distances have the great theoretical advantage that they can be observed more frequently than the other just mentioned methods; but as regards the accuracy of lunars measured with reflecting instruments, I entirely share Mr. Coles's opinion, viz., that, although the principle is very simple, the observation becomes in many cases difficult and is liable to errors, so that a single set of lunar distances, even when taken by an experienced observer, is of comparatively little value.

Professor Jordan, the specially-appointed astronomer to Gerhard Rohlfs' expedition into the Libyan Desert, took more than three hundred lunars in the course of that journey, and published an elaborate criticism on the determinations of longitudes by this method, coming to the conclusion that lunars taken by the sextant, or other reflecting instruments, compared with a carefully-laid down itinerary, are of little value.

Lieutenant von Höhnel, the companion of Count Teleki, on his remarkable journey to Lake Rudolf came to precisely the same

conclusion, and has, as he states in *Petermanns Mitteilungen*, intentionally avoided using his own carefully-made lunar observations in the construction of his map, as he found the data of his itinerary much more trustworthy. Professor Jordan therefore recommends to limit the application of this method to coast places and permanent inland stations, where many sets of lunars can be taken and compared. He has found that the average error of a sextant measurement, taken by a freehand observation, is not less than twenty seconds of arc, an error which is too great for a reliable determination of longitudes for scientific purposes. Single lunars are therefore of no scientific value whatever, and it is only by a great number of carefully-selected sets that good results can be expected, as Mr. Coles has pointed out. In the face of this single lunars taken by the sextant or reflecting circle should be entirely avoided by travellers who hurriedly pass through a country, and it follows, therefore, that this method is of very little value for laying down the routes of the scientific travellers of our days.

There remain the methods of moon culminating stars and occultations, but it appears to me that very few travellers consider themselves competent to make this kind of observation, otherwise the number of inland longitudes would not be so infinitely small as it actually is.

Under these circumstances, I think that a method of observation, quite different from those hitherto applied, and combining the frequency, simplicity, and other advantages of the lunar observations, with the accuracy of the method of occultations, will be welcomed not only by the traveller who is obliged to pass quickly through a foreign country, but also to those who possess more detailed astronomical knowledge. This method consists in repeatedly photographing the moon and one of the principal planets or fixed stars within a very short period of time on the same plate.

It was at the meeting of the British Association at Cardiff that, in the course of a conversation with Mr. Coles and Mr. Ravenstein, I first hit upon the idea of determining geographical longitudes in this way. I did not, however, think much about it at the time, and it was only some weeks afterwards that I decided to make some experiments in connection with this matter. As the position of the planet Jupiter in September and October, 1891, was favourable for the purpose, I made my first experiments with this planet. Using an ordinary camera, with a small rectilinear lens, I found that Jupiter could be photographed with an exposure of only five or ten seconds, and that the planet appeared on the negatives as a small black line. The next step was to find out whether stars of less brilliancy than Jupiter could be photographed in like manner, and my thanks are due to Mr. John Thomson, who made a series of exposures by which it was proved that fixed stars may be registered on the plates in precisely the same way as

Jupiter can. The proper motion of the moon was then shown by micrometrically measuring the distances between subsequent exposures of that body, and comparing them with the corresponding exposures of the star on the same plate, and as this too gave very satisfactory results, I constructed a camera for this special purpose.

The ordinary photographic camera is unfit for photographing lunars, for various reasons. In the first place the usual construction with bellows is much too unsteady and shaky for the minute accuracy which the micrometric measurements require. Secondly, as a series of parallel exposures has to be taken in as short a time as possible, the dark slides of the camera must be movable; and thirdly, the distance of the plate from the lens must be carefully kept the same during the whole process of an observation, as this distance forms an important factor in the computation of the results.

The camera which I have had constructed fulfils all these requirements. It consists of a simple rectangular wooden or metal box, with rigid walls. The back of the camera is fitted with springs which, while allowing the dark slides to move upwards, keep them at intervals of $\frac{3}{8}$ inch from each other. For bringing the objects into position a plate either of ground or of common glass is employed, covering the upper half of the back of the apparatus, whilst the lower half of the camera is closed by a wooden partition. The horizontal line (going through the centre of the camera), which forms the lower end of the glass plate, is provided with a centimetre or inch-scale, which is graduated right and left from the centre with the same figures. The whole arrangement is extremely simple; and not less simple is the process of making the observation itself. The apparatus is pointed in the direction of moon and star, and when both bodies appear on the just-described ground, or clear glass plate, the camera is turned until the line from the centre of the moon to the star is parallel to the scale at the lower end of the glass plate, and then the images of both bodies are brought down to this line, and made equidistant from the centre. In this position they are brought into focus, and then the whole apparatus is firmly screwed down. The object of this arrangement is to bring the bodies always into a plane passing through the principal axis of the lens, and to have them at equal distances from the point where the principal axis cuts the plate. Then the dark slides are substituted for the glass plate, and after the time has been noted, a series of exposures is taken, the dark slides being lifted at the end of each exposure by means of the before-described springs. I usually make exposures of fifteen or twenty seconds duration, with fifteen or ten seconds interval, so that two exposures are made in every minute.

For the elimination of all possible inaccuracies of the photographic film, or of the lens, the lunar distances thus registered are checked by repeatedly photographing on the same plate two fixed stars, the positions

of which are taken from the *Nautical Almanac*, or from a star catalogue, and the angular distance of which can easily be computed therefrom. The plates are then developed, dried, and the distances between the star and one of the limbs of the moon measured by the negatives. About the method of measuring I shall speak afterwards. It will be seen that the apparatus as well as the method of observation are both of the utmost simplicity. There is no levelling and no reading off of angles whatever required, and the whole observation consists in adjusting the camera to the moon and star, bringing them into the centre of the apparatus, and making in rapid succession a set of exposures. *Of course the local time as well as the geographical latitude must be known, and the thermometer and barometer read off in the usual manner.* The results which I have obtained in photographing lunars in this way, prove that a better method as regards accuracy and simplicity could hardly be found. The simplicity of the method I have already explained, and I will merely add that a knowledge of the principal stars of the heavens, viz., those of first and second magnitude, is amply sufficient for the practical application of this new method, whilst experience in photographing need not go any further than to the preparation of the negatives, which is in this case a most simple process with which anyone can make himself thoroughly acquainted in a few hours, as nothing else is required on the plates than a black image of the stars and of the disc of the moon.

Several objections have been raised against this method.

Why should a traveller, besides his sextant or theodolite, take an additional apparatus with him?

Would this new method be accurate enough to compete with the various old ones?

Consider how infinitely small is the number of reliable longitudes which have been taken in the interior of countries other than Europe and North America. Take for instance Africa. Many scientific travellers have during the last century explored this continent in every direction, and the correct laying down of their route was the principal object with all of them. And how many correct longitudes are the result of their joint efforts? Dr. Lüddekke is of opinion that there are, up to the present time, hardly a dozen well-determined longitudes to be found of the interior of Africa. Many of our famous explorers, *e.g.* Barth, did not even try to make astronomical observations, and how unreliable the results of many others who made them are becomes evident if we compare the longitudes which different travellers give of the same localities. Of course there are exceptions, like O'Neill's determination of Blantyre, Dr. Vogel's route to Lake Chad, and others; but, generally speaking, as regards astronomically well-determined positions, the interior of Africa is to-day almost as much a *terra incognita* as it was a hundred years ago. The reason of this complete failure is evidently twofold—firstly that the reliable

methods are too complicated or difficult for the majority of travellers, and secondly that several of the instruments as well as of the methods employed are not accurate enough.

As regards the accuracy of my new method I am glad to be able to show that it surpasses by far anything that has been obtained by reflecting instruments.

Mr. Coles has shown that any method which does not determine the position of the moon within $\frac{1}{120}$ of her diameter, is not accurate enough for the determination of longitudes, or, taking the average diameter of the moon as 1867 seconds of arc, the instruments employed for the measurement of lunar distances must have at least an accuracy of 15 seconds of arc.

I give a table which represents different sets of lunars photographed by my above described camera. The distances are expressed in millimetres and decimal parts of a millimetre each. Each single lunar distance is taken at an interval of half a minute from the preceding one, and I beg the reader to notice the increase of the distances from the beginning of the observations to the end.

Lunar Distance.	Lunar Distance.	Lunar Distance.	Fixed Star Distance.
Venus and Moon, March 31st, 1892.	Spica and Moon, June 5th, 1892.	Jupiter and Moon, October 7th, 1892.	Sirius and Rigel (β Orionis), March 4th, 1893.
(1) 13·442 mm.	(1) 20·646 mm.	(1) 106·816 mm.	(1) 138·153 mm.
(2) 13·459 ,,	(2) 20·655 ,,	(2) 106·833 ,,	(2) 138·153 ,,
(3) 13·468 ,,	(3) 20·663 ,,	(3) 106·859 ,,	(3) 138·153 ,,
(4) 13·476 ,,	(4) 30·672 ,,	(4) 106·876 ,,	(4) 138·153 ,,
(5) 13·485 ,,	(5) 20·680 ,,	(5) 106·893 ,,	(5) 138·153 ,,
(6) 13·493 ,,	(6) 20·697 ,,	(6) 106·918 ,,	(6) 138·153 ,,

These figures speak for themselves. The sets were taken with an aplanatic (*rapid rectilinear*) lens of Dallmeyer's, an angle of 34° of this lens corresponding to 200 millimetres. The micrometric measurements were made with a Zeiss microscope provided with Professor Abbé's illuminator, the limit of accuracy being $\frac{1}{100}$ of a millimetre. This amount therefore corresponds to six seconds of arc for every exposure. But as a set of at least sixteen lunars is always taken, the accuracy, according to Professor Jordan, becomes three to four times greater, and is consequently at least two seconds of arc for every single observation. All this is done within the space of a few minutes with a comparatively small lens, and you see that this accuracy surpasses *more than seven times* the standard figure which Mr. Coles has computed as necessary for an efficient lunar observation.

Professor Vogel, one of the greatest authorities on stellar photography, recently stated in an address to the Berlin University, that his methods

of photographing stars permitted twenty times more accurate measurements than is possible with any other methods of precision. Comparing photographic lunars with the usual sextant method, the superior accuracy of photography as applied to heavenly bodies is confirmed. Anybody acquainted with micrometric measurements can easily verify these statements. All that is necessary is, as I have said before, an illuminating apparatus of Abbé's construction attached to the microscope; and, moreover, a strong, direct light (either sunlight or an incandescent or Welsbach lamp) for the observation.

As only small distances can be measured micrometrically I am using an astronomical *réseau*, on which the lines are 5 millimetres distant from one another. This *réseau* is screwed down upon the plate, and the whole millimetres are then read off whilst the decimal parts are determined micrometrically. This *réseau* is the same as that used at all the principal observatories of the world for measurements in stellar photography, and I obtained the *réseau* which I am using from the Royal Observatory at Greenwich. The absolute accuracy of the measurements is therefore beyond dispute. Moreover, Messrs. Troughton and Simms, the well-known mathematical instrument makers, have constructed me another millimetre scale for micrometric measurements, which I have compared with the *réseau*, and which is just as accurate in its results.

I have said before that my results are obtained with a comparatively small lens. By using aplanatic lenses of the same kind, but one or two sizes larger, the accuracy of the results can be further greatly increased, provided that we take stars as near as possible in the moon's path. Of course, the larger the lens, the smaller will be the angular distances included in the field, if we keep the photographic glass plates within reasonable size. But small distances are no disadvantage, on the contrary they are a decided advantage, because the conditions of the atmosphere in the same part of the sky are always alike, which is not necessarily the case with large distances. The chief reason why large lunar distances are usually used for observations with reflecting instruments, is the well-known property of the latter—to give only half the angle of the measured angular distance. For this reason small distances are not printed in the *Nautical Almanac*, but everybody knows that the distances can be computed directly from the right ascensions and declinations of moon and star, which are given in the *Nautical Almanac*.

I leave it to be decided—after what I have said—whether it will be worth while for future travellers to add to their outfit a camera adapted for the observation of photographic lunars. In that well-known book, 'Hints to Travellers,' travellers are advised to take with them a camera and not less than three different kinds of photographic lenses, one of them being the identical Dallmeyer

lens which I am using for photographic lunars. Hence the only additional outlay will be the camera.

I have to add that the apparatus and the method described have nothing whatever to do with the so-called photo-theodolite and the photogrammetric measurements made with the same. The complicated construction of the latter instrument makes it inferior for astronomical observations to the ordinary theodolite with which it is almost identical, differing only in the addition of a photographic camera. Some astronomical work has been done with the photo-theodolite, latitudes especially having been determined by it, but the results were not very satisfactory. Mr. Ravenstein was therefore fully justified in stating in his presidential address to the Geographical Section at the meeting of the British Association at Cardiff, that the photographic camera had not as yet been utilised for ascertaining the relative positions of heavenly bodies.

What I claim for my new method is, as I have said before, the extreme simplicity of the apparatus, and the minute accuracy of the results.

I have to express my most sincere thanks to a number of gentlemen who have been kind enough to render me valuable assistance. In the first place I have to thank Mr. H. H. Turner, M.A., F.R.A.S., Chief Assistant of the Royal Observatory at Greenwich, and Captain Wharton, R.N., F.R.S., Hydrographer to the Admiralty. Mr. W. H. Simpson of the Royal Geographical Society has given me much useful practical assistance. To Captain Wharton I am indebted for his kindness in providing me through the Greenwich authorities with a box chronometer and with a pocket chronometer.

But not less my thanks are due to Mr. J. Coles, the Society's map curator, and Mr. John Thomson, the Society's photographer.

In conclusion I may be permitted to add that the results which have been obtained with this new method, prove that it will in future do good service to geography, and that the most difficult problem of mathematical geography, viz., the astronomical determination of geographical longitudes, is now solved by a simple process which could, I feel sure, hardly be more convenient in its application and more accurate in its results.

A VOYAGE TOWARD THE ANTARCTIC SEA, SEPTEMBER 1892 TO JUNE 1893.

In September 1892 a fleet of whaling vessels, the *Balæna*, *Active*, *Diana* and *Polar Star* sailed from Dundee to prosecute whale-fishing in the Antarctic Sea. By the intervention of Mr. B. Leigh Smith, the surgeons for the two larger vessels were selected with a view to their scientific

acquirements, and equipped by him and others with a complete set of instruments for collecting natural history specimens and observing the meteorological and other physical conditions of the region where they would pass the southern summer. The Royal Geographical Society gave a grant of instruments, including chronometers and standard compasses to the vessels so that their position might be ascertained more accurately than the instruments ordinarily used by whalers would permit. The captains of the vessels were requested to report on their observations to the Society, and Captain Robertson of the *Active* has done so. This report with chart, and accompanied by the very detailed reports of Dr. Donald, who sailed on the *Active*, and Mr. Bruce on the *Balæna*, are being prepared for publication in a separate form by the Society. Meanwhile the following preliminary reports are published in view of the interest attaching to the paper on Antarctic Exploration which will be read by Dr. John Murray, of the *Challenger*, at an early meeting.

Preliminary Report by Wm. S. Bruce.

After a boisterous passage of over 100 days, we met our first iceberg on December 16th in 59° 40′ S. 51° 17′ W., and a second berg was passed on the same day. We continued on a more or less southerly course, passing to the east of Clarence Island, the most easterly of the South Shetland group; Danger Islets were sighted and passed on December 23rd, and on Christmas Eve we were within one mile of Ross's position of New Year's Day half a century ago. Ross was the first to visit this part of the Southern Seas, and we had the honour of paying the second visit. From this time until the middle of February we circled round this position roughly between latitudes 62° S. and 64° 40′ S. and longitudes 52° and 57° W., our westerly boundary being that part of Terre Louis Philippe which forms Erebus and Terror Gulf, bounded to the southern extremity by Seymour Island and to the north by Joinville Land.

Land.—On the *Balæna* we were unfortunate in never being within six miles of the land, except in the case of the Danger Islets; Captain Larsen, however, of the Norwegian barque *Jasen*, who seemed to be interested in exploration, effected a landing on Cape Seymour, where he obtained several fossils, as well as on the South Orkneys. Dr. Donald also was fortunate in this direction, and he will relate his own experiences. What land the *Balæna* saw was entirely snowclad, except on the steepest slopes, where the snow could not lie. These parts appeared to be quite black, and so far as I could judge were of igneous origin. The few rocks I obtained from the ice and from the stomachs of penguins bear this out, Prof. James Geikie finding olivine, basalt, basalt lava and possibly gabbro among them. Rock

fragments and earthy matter were seen on some of the bergs and ice. On January 12th we saw what appeared to be high mountainous land and glaciers stretching from about 64° 25′ S. 59° 10′ W. to about 65° 30′ S. 58° W.; this I believe may have been the eastern coast of Graham's Land, which has never before been seen. But it would be unwise to be too certain, for it must have been 60 miles distant from us, and Ross found that in these regions one is not only liable at some future time to sail over one's own land, but occasionally also over that laid down in the chart by other folk. We were unable, however, to make further investigation, for our vessel was not yet filled with blubber. Ross calls the attention of future visitors to doubtful volcanic activity in Joinville Land; there is certainly no sign of present activity.

Bergs.—The whole of this district south of 60° S. is strewn with bergs, and south of 62° S. they become very numerous. No entire day can be recorded when bergs were not seen. South-east of Danger Islets they were most thickly distributed. Here I have counted at one time from deck as many as sixty-five, all of great size, to say nothing of smaller ones. In December many lay 60 to 100 miles north-east of Joinville Land, and likewise in January, in about 64° 30′ S. and 54° to 56° W. The longest was about 30 miles long, another about 10 miles, and several were from 1 to 4 miles long. The highest berg the *Balæna* saw was about 250 feet high; but many were not over 70 or 80 feet, the average possibly being about 150 feet high. All these bergs are tabular, or weather-worn varieties of the tabular forms. They become pierced with caves, and these are sometimes connected with funnel holes, through which, as the swell beats up the caves, immense columns of spray are projected. They may be finely castellated, pillared, or arched. One that I saw was beautifully conical. The base of the bergs is coloured pale brown by marine organisms, and other brown streaks are seen beyond the water-level. I failed to observe any luminous glow. Mr. Burn Murdoch has admirably depicted these bergs in numerous paintings. They present a magnificent appearance. Clothed in mist they raise their mighty snow-clad shoulders to a stately height, or shine forth brilliantly in the sun. Although they are of the purest white, yet they glow with colour. The crevices exhibit rich cobaltic blue, and everywhere are splashes of emerald green.

Pack Ice.—The pack ice is said not to be heavier than that of the north, and is similar in nature. It is frequently coloured brown by a diatom *Corythron cryophyllum*, which swarms in the water near the main pack. We first met the pack ice on December 19th in 62° 20′ S., 52° 20′ W.; it was dense and ran east and west. In January we met the pack edge running east and west in 64° 37′ from about 54° W. to 56° W. On January 12th, when off Cape Lockyer and in sight of

what I believe was the easterly coast of Graham's Land, we saw what appeared to be open water to the south, and, possibly, I think we might have penetrated very far to the south, and even, perhaps, to have attained a higher latitude than our brave and distinguished predecessor, Captain James Weddell. We might, at all events, have made a closer examination of what we believed to be the easterly coast of Graham's Land. Deeply to my disappointment the ship turned back again to literally soak in blood.

Sea.—The colour of the sea varies from a dirty olive-brown near the pack edge to a clear blue further from it. In the bluest water it was most profitable to hunt for seals. Deep-sea temperatures were taken and a colder intermediate stratum was indicated. Dr. Buchan tells me the conditions are similar to those north of the Wyville Thomson ridge. This is the first occasion on which the Negretti and Zambra thermometer and Dr. Mill's reversing frame were used in such high southern latitudes. A few observations on the freezing and melting point of sea-water were obtained. We never experienced any very great swell. Some few observations for currents were made, and floats were thrown over from the ice to some degrees north of the equator. Bergs seem to induce currents. The lead was cast in the vicinity of Danger Islands, and some few bottom samples were obtained. These are being examined by Dr. John Murray, of the *Challenger*, and Mr. Robert Irvine. The depth varied from 70 fathoms to 300 fathoms and no bottom. I brought home several water samples, and these Dr. Gibson and Mr. Robert Irvine find to be similar to samples obtained from high northern latitudes.

Meteorology.—Periods of fine calm weather alternate with very severe gales, usually accompanied by fog and snow. The barometer never attained 30 inches. The records of air temperature are very remarkable; our lowest temperature was 20°·8 Fahr., our highest 37°·6 Fahr., only a difference of 16°·8 Fahr. in the total range for a period extending slightly over two months, compare this with our climate; where in a single day and night you may get a variation of more than twice that amount. The average temperatures show a still more remarkable uniformity.

December averaged 31°·14 Fahr. for one hundred and fifteen readings; January 31°·10 Fahr. for one hundred and ninety-eight readings; February 29°·65 for one hundred and sixteen readings, a range of less than 1½° Fahr. This I consider to be very significant, and worthy of special attention to future Antarctic explorers, for may it not indicate a similar uniformity of temperature throughout the year. Antarctic cold has been much dreaded by some; the four hundred and twenty-nine readings I took during December, January, and February show an average temperature of only 30°·76 Fahr.; this being in the very height of summer in latitudes corresponding to the Faroe Islands in the

north, but I believe the temperature of winter will not vary very much from that of summer. This uniformity of temperature partly accounts for the great accumulation of ice which is formed, not on account of the great severity of the winter but because there is practically no summer to melt it. The conformation of land and sea in the south also seems to bear this out. Let us follow out Harvey's motto, "to seek and study the secrets of nature by way of experiment." Personally I am not in a position, as far as pecuniary resources are at my command, to undertake this work, but my heart is in it, and if by any means the chance is given me I am ready to winter in the Antarctic.

On February 18th we steered for the Falklands. The following afternoon we sighted Clarence Island, its three bold ridges looming through mist and scud. The land was wild and majestic, towering over the adjacent bergs. It was entirely snowclad except on the steepest slopes, which chiefly face the south. On February 19th we passed our last iceberg in about 60° 27′ S. 53° 40′ W., *i.e.* 40 miles north of Clarence Island. Port Stanley was reached on February 25th, Portland on May 24th, and finally on May 30th we came to rest at Dundee.

Mr. Seebohm has vividly pictured the onrush of summer in the Arctic; but how different in the Antarctic. There, there is eternal winter, and the snow never melts. As far north as man has travelled he has found reindeer and hare basking in the sun, and country brilliant with rich flora; within the Antarctic circle no plant is to be found.

Long shall I remember the beauties of these ice-bound scenes, the grandeur and the silence. One's feelings cannot be expressed, one's thoughts cannot be fathomed as one stands alone during the night-watches on a deserted deck while the sun skirts the horizon and paints the world with colour, and the white ice floats in the calm black waters.

Preliminary Report by C. W. Donald, M.B., C.M.

Any information, however slight, about places so little known and so seldom visited as the Antarctic lands is of value to the scientist and geographer. The Antarctic expedition was originally proposed by a Dundee company as a commercial undertaking, the object of which was to discover and capture a true whale-bone whale living under similar conditions to the black or Greenland whale of the north. The idea of combining with this some scientific research originated with Mr. Leigh Smith, who brought the subject to the notice of the Royal Geographical Society.

Leaving Dundee in September of last year we had a pleasant though somewhat stormy voyage out. The fleet consisted of four ships. Mr. Bruce and Mr. Burn Murdoch travelled together on the *Balæna*, while I was accommodated on board the *Active*. Both of these ships were thoroughly fortified for work among ice, and had spent many years

in Greenland and Davis Strait. The captains were perfect masters of the somewhat difficult subject of ice-navigation, and seemed to feel at home once more when we reached the smooth, quiet waters of these ice-bound regions.

On the passage out we, on board the *Active*, touched at the beautiful Island of Madeira in October, and two more months landed us in the barren Falkland Islands. Sailing thence on December 11th, we crossed the stormy waters to the east of Cape Horn, and saw our first iceberg on December 18th. On the same day we sighted Clarence Island—one of the South Shetlands. These are called after our own northern Shetlands, and the part sighted by us lies only some 60 miles nearer the pole. But what a difference between the two places. Our own Shetlands bright with ladies dressed in light summer garments, and carrying tennis racquets and parasols, the South Shetlands, even in the height of summer, clad in an almost complete covering of snow, only a steep cliff or bold rock standing out in deep contrast here and there, the only inhabitants being birds or seals; and even the bird-life, with the exception of the penguins, is scanty. Sir James Ross on his third voyage entered the ice at nearly the same spot, and fifty years before—all but a week—had sheltered from a westerly gale under the inhospitable shores of Clarence Island. Its highest point stands 4557 feet above sea-level.

For a few days after this we were delayed by fog—a frequent occurrence among ice both in the south and in the north. On December 23rd we sighted Danger Islands, lying immediately to the east of Joinville Island. The sea around them was thickly studded with icebergs, most of which were aground, and many of large size. These bergs require a word of description. Unlike those seen in the north, they are quite flat on the top, their sides forming perpendicular cliffs of 100 feet to 200 feet in height. In shape they are roughly quadrilateral. Many of them were over a mile in length, and we saw one which was at least 30 miles long. These enormous masses of ice are probably built up where the land forms a long gentle slope from a considerable height down to the sea-shore, the same slope continuing for a mile or more out to sea. Snow accumulates on this slope and gradually slips out to sea, forming what is called an ice-foot. The outermost portion of this at length reaches a depth at which it can float, and soon breaks off to form a berg. Taking the average snowfall as one inch a day, that is to say, about 30 feet a year, the foundations of each of these bergs must have been laid down about sixty years before it becomes a separate entity. Now the question naturally arises—why should these bergs differ so much from the high pinnacled bergs of the north? The latter, it is well known, are formed from deep glaciers, running in narrow ravines. But still this does not answer the question. I think the explanation must lie in the geological structure of the two lands. That in the north is composed for the

most part of water-bedded rocks, while in the south no sedimentary formations have been seen—all the coast-line at least being of volcanic origin, and, therefore, as the geologist would explain, not conducive to the formation of deep ravines. This question, however, would require to be treated separately and at length by the geologist.

Passing Darwin Islet, the most southern of the Danger Islands, we caught a glimpse of Paulet Island through the mist. The latter is a high conical island rising to 750 feet above the sea. The mist and fog which prevailed during the first five days of our stay amongst the ice prevented our having a good view of any of these places, and concealed Joinville Island altogether. Some days later, however, we had an opportunity of examining them more closely. On December 23rd we fell in with two of the other ships belonging to the Scottish fleet, and on the 24th the three of us steamed up and anchored to a large ice floe in lat. 64° 23′ S., long. 56° 14′ W. From here we had a magnificent view of the mountains of Palmer's Land, lying to the south of the Erebus and Terror Gulf. These seemed to form a small chain, culminating in the peak of Mount Haddington, the height of which Ross gives at 7050 feet. The scene on that evening from the ship's deck was one of the most impressive I have ever witnessed. To the west lay this chain of snow-clad mountains, thrown into various shades of light and dark by the low sun, with here and there the face of a cliff or black rock standing out in deep contrast to the surrounding snow. To the south the ice-floe, studded with numerous small bergs and hummocks, stretched as far as the eye could reach; out to the eastward lay a long chain of bergs, their perpendicular faces tinged bright red by the sun's rays. Between these bergs and the floe lay an open expanse of dark water. To the north was the loose scattered ice, small bergs and dark water channels, through which we had just steamed. Throw over this the lilac glamour so frequently seen in the Antarctic, which, combined with the absolute stillness and quiet, broken only occasionally by the splash or harsh "quangk" of a penguin, or the soft "tweet" of the snow petrel, made up a magnificent and imposing spectacle. Christmas Day was one to be remembered. The greater part of it was calm with bright sunshine. During the early part of the afternoon the temperature of the air rose to 37° Fahr. The atmosphere was very clear. By daylight the scene seemed somewhat harsher in outline; but in the twilight, with the sea like a mirror, and slight ice forming on the surface, the effect was, if possible, enhanced, and acted on one like a spell. On December 30th we again found ourselves in the neighbourhood of Paulet Island, and for the next ten days we had excellent opportunities of observing the lie of the land about the southern portion of Joinville Island.

Paulet Island does not appear quite so formidable as Ross describes it. Its height is 750 feet. In shape it is more or less conical. Its north side, of which I am fortunate enough to possess a photograph, is

almost clear of snow, and presents a shelving beach covered with loose stones. On these numerous penguins and seals were lying. This beach forms the termination of a triangular valley, which cuts deeply into the face of the hill. We did not attempt a landing here, though such could easily have been effected. A bare rock, lying to the north of Paulet Island, we recognised as Eden Islet.

To the west of Paulet Island the land is low, forming, as we discovered some days later, a separate island. To the north the land slopes rapidly up into a small cluster of hills, the highest point being a remarkable double peak called by Ross Mount Percy, and rising to a height of 3700 feet. The whole southern slope of this seems to form one glacier, the bergs yielded by it being from 30 to 60 feet high. Many of these were heard and seen to break off. A few came down in the form of a small avalanche, causing a loud noise which could be heard for many miles around. Lying to the north of Paulet Island, and forming an indentation between the low and the high land, is what we took at the time to be a deep bay. Ross indicates the position of this in his chart. It turned out later to be the eastern entrance to the channel which separates Joinville Island from the long flat island lying to the south of it. In the north of the Erebus and Terror Gulf lie several small islets. Two of these are high, conical, crater-shaped rocks lying 4 or 5 miles off the north shore.

Ross was quite right in supposing that a passage exists between Joinville Island and Louis Philippe Land, leading from the Erebus and Terror Gulf into Bransfield Straits on the west. Through this passage a considerable tide runs with the ebb and flow, and we felt a slight westerly swell on nearing it. I have no recollection of seeing the tower-shaped rock which Ross called D'Urville's Monument, but in nearly the position assigned to it, though further inland, is a conspicuous hill about 600 feet high, with a bare conical summit. This, looked at from the south, might easily be supposed to rise from the low land near the shore. Near the western extremity of Joinville Island, called by Ross Point Bransfield, we discovered a channel running inland in an easterly direction. At the entrance were two penguin rookeries, one on each shore. I landed on the shore to the south, collected specimens of the rocks and visited the rookery. The specimens are at present being examined by Professor James Geikie. They consist chiefly of igneous and schistose rocks, the former mostly basalts. The rookery was occupied by a somewhat rare variety of penguin, the white-headed form or *Pygoscelis Papua*. These birds have a much harsher cry than any of the other varieties seen. There were only some forty to fifty nests altogether The beach on which they are situated forms a long low point, the surface of which was bare and made up of small, flat angular stones. A few patches of moss here and there, and the seaweeds along the shore formed the only vegetation. Proceeding eastwards along the channel which our captain has

named "Active Sound," it was found to average about 2 miles in breadth for the first 8 to 10 miles. The two shores are nearly parallel, and each is lined by an ice-foot or cliff, that on the north shore being about 60 feet in height, while the opposite one is somewhat lower. Here and there a rock or small beach showed beneath the ice-foot.

About 3 or 4 miles from the entrance we passed the conspicuous hill already referred to. It is situated on the north shore and rises very abruptly to a height of 600 feet. It forms a single isolated peak; soundings taken in this part of the channel gave no bottom at 40 to 60 and 80 fathoms. On the north shore the snow slopes rapidly up from the ice-foot, being here and there broken by a long crevasse or creek, or a black corner of rock standing out. On the south shore the slope is much more gradual; the snow rises in one unbroken slope to the height of 100 to 150 feet. As we proceeded eastwards the channel became broader, and was found to be continuous with the inlet seen to the north of Paulet Island. It thus cuts off the southern portion of Joinville Island as a separate island. To this our captain gave the name of Dundee Island. It forms a long, narrow snow-covered plain, the highest point being not more than 150 feet above sea-level. Its total length, from Point Bransfield to Cape Purvis is 29 miles, its average breadth about 4 miles. The channel is broadest about the centre, where it measures 5 miles across. From this point it narrows towards the eastern entrance, which is about 4 miles across. About the middle of the channel, on the north shore lies "Gibson Bay," bounded on the east by the prominent headland called "Cape Alexander." In the hard black rock here exposed are several strata of a lighter colour and softer material, dipping to the south at an angle of 45°. These appeared to be of sedimentary formation.

Immediately to the east of Cape Alexander is a deep fiord running inland and turning to the west, towards the head of Gibson Bay, thus converting the headland into a small peninsula. To the eastward were two penguin rookeries, one of very large size, and occupied by countless numbers of the common or black-throated penguin.

Lying opposite Cape Alexander on the south shore is a sunken reef, on which we had the misfortune to strike. Though a gale of wind was blowing at the time no serious damage resulted, the ship being got off in about six hours little the worse of the accident.

Working to the south through the Erebus and Terror Gulf, the land to the west is indistinctly seen as a range of low hills. The peninsula which forms the southern boundary is deeply cut into by an arm from the gulf called by Ross Admiralty Inlet. The land to the east of this rises in a long, unbroken snow-covered slope to a height of 2000 fee and has received the name of "Snow Hill." A long low island sepa rated from the Snow Hill by a narrow channel completes the easter boundary. To the west of the inlet, the imposing mass of Mount

Haddington rises in successive volcanic terraces. Captain Larsen, of the Norwegian ship *Jasen*, landed on the island to the north of Snow Hill, which may be called Seymore Island, and obtained there a number of fossils—specimens of which are now in the hands of Prof. James Geikie. They are mostly jurassic forms. Captain Larsen reports that he found no traces of vegetation there, the surface being formed of volcanic *débris* and numbers of these fossils.

One more note with regard to land. We were not in a position to see the land described by Mr. Bruce as lying to the south-west of Cape Lockyer, but Captain Larsen reports having seen land in the same place. I am inclined to think that this is the eastern shore of Graham's Land, that is to say, part of the mainland or continent itself. The probability is that the rest of the land seen forms a group of islands lying to the north of this mainland.

Ross did not reach the latitude of 65° on this meridian, being stuck in pack-ice lying off Cape Lockyer. My impression is that round this cape is a complex series of currents, which collects pack-ice and so forms a barrier impenetrable by any ship without steam. Two of the steamers—the *Diana* and the *Jasen*—worked through this and approached nearly to the 65th parallel. They both report that they could easily have gone further had they seen any advantage to be gained from it, there being plenty of water-channels through the ice. This was in the end of January, or beginning of February, a short time after a long-continued southerly gale, and it is interesting to note that the pack met with by them at this time was wholly composed of sheets of thin bay ice. Out to the eastward lay a continuation of the long chain of bergs to which I referred before.

An expedition composed of two ships devoted solely to scientific pursuits could do an immense amount of work here. I have talked this matter over with various men interested in whaling, and have come to the conclusion that such an expedition could be undertaken for one season at the very small expense of £4000 for each ship. It is useless to trust to the sealers for exploring purposes, for as long as they can fill their ships with blubber in latitude 64° they will never penetrate to 65°.

THE RUINS IN MASHONALAND.

Mr. Swan has made several discoveries of fresh ruins on his way up to Fort Victoria, and writes as follows to Mr. Theodore Bent:—

July 13th, 1893.—At the Lotsani I found one set by the side of the road and about ¾ mile from the drift, and about 200 yards from the Limpopo. Another set was nearer the Limpopo and the drift. Besides these I found several shapeless heaps of stones. I was delighted

to see that they were of the Zimbabwe period, although the workmanship was not quite so good as at the great temple. The courses were fairly regular, and the battering back of each successive course and the rounding of the ends of the walls were very cleverly done. The walls were built on circular curves, and of the same gneissose granite as Zimbabwe. The doorways had places for stakes. I found that the length of the radius was equal to the diameter of the Lundi temple, or the circumference of the great tower. I then proceeded to orientate the temple. The sun was nearly set. I sat on the centre of the arc, and was delighted to find that the sun descended nearly in a line with the main doorway. I then recollected that the winter solstice was only seventeen days past, and on allowing for the difference in the sun's declination for that time, I found that a line from the centre of the arc through the middle of the doorway pointed exactly to the sun's centre when it set at the winter solstice. The other ruin is also orientated to the setting sun.

July 16th, 1893.—I found two ruins and several heaps of fallen stones on the left bank of the Lotsani River at its junction with the Limpopo, both built in the same style as Zimbabwe. Having but little time, I devoted myself entirely to the smaller of the two, and found that the sun, when setting at the winter solstice, would shine through the middle of one of the doorways on the centre of the arc. This, I fancy, places our theories regarding orientation and geometrical construction beyond a doubt.

August 7th, 1893.—I have a really splendid bagful of ruins. At the Lotsani there were two (which I have already described), in the Lipokole Hills two, near Semalali four, and one actually within 300 yards of the mess-room at Maclutsie. I am going to see one on a ridge above the Makalanga village, up the Shashi, which you visited with Captain Nisbet. I also hear of one lot on the Ipagi River, this making a dozen in all. I was able to fix the radii of two curves of the one at Maclutsie, and of four curves near Semalali, and they are all constructed on the Zimbabwe plan. The two on the Lipokole Hills are fortresses, and are not built on the plans of the temples. The temples generally seem to consist of two curves only, and are in half-moon shape, and seem never to have been complete enclosures. I have not been able to settle the orientation of any of them yet. I shall send plans later. Although all these temples are built of very rough stones, no good ones being obtainable, yet the curves are extremely well executed, and are generally true in their whole length to within one or two inches.

I made some excavations in a small tumulus at the great ruin near Semalali. The tumulus consisted of wood-ashes, stones, soil, and much pottery and bones. I found the little sun images of terra-cotta, and some fragments of *very fine* pottery. Some pieces were peculiar in shape. One, not a very fine piece, had curious decorations on a *concave*

part. Another was a very curious nozzle of a jar, and another had one of those holes for suspension like the Antiparos pots. I also got a fragment of an ivory bracelet (plain).

September 5th.—Near the 'Msingwani River are seven lots of ruins, and of these at least three were by the Zimbabwe people. I measured the radii of three curves here—17 : 17, 27, and 27 feet respectively, and they were laid off with wonderful accuracy.

The ruin at the Lundi River, which we did not measure accurately on our way up, is also very interesting. One door is to the north, and the other 128° and a fraction from it; so that the line from the centre to the sun rising at midwinter bisects the arc between the doorways. If one could measure the circumference of this arc with sufficient accuracy, we could deduce the obliquity of the ecliptic when the temple was built. I made an attempt, and arrived at about 2000 B.C.; but really it is impossible to measure with sufficient accuracy to arrive at anything definite by this method, although from it we may get useful corroborative evidence.

September 8th.—I hope to spend two days and a night at Zimbabwe.

Major Sir John C. Willoughby has written a short record * of five weeks' work at the Mashonaland ruins in continuation of that done by myself in 1891. A few additional objects have been found, but in the list of things found, which Sir John places at the end of his pamphlet, I see hardly anything except duplicates of those found by me. One object, however, may be of use in considering the question of the original constructors of these ruins, which Sir John describes as "a piece of copper about six inches in length, a quarter of an inch wide, and an eighth of an inch thick, covered with a green substance (whether enamel, paint or lacquer, I am unable to determine) and inlaid with one of the triangular Zimbabye designs." Also some very fine pottery was discovered and crucibles with specks of gold in them, similar to those found by me. Sir John objects to Mr. Swan's theories respecting the construction of the temples, but, as he says, "Mr. Swan has chiefly based his theory of the orientation of the temple" on the existence of a hole in the wall, he shows that he has not grasped the point at all. The said hole in the wall had nothing whatever to do with Mr. Swan's theories, but was the basis of an entirely subsidiary theory, which from want of data to go upon was abandoned. Mr. Swan writes that on his journey up to Victoria he has measured no less than twelve ruins, and since they all agree with his theory respecting the orientation and curves of the great Zimbabwe ruin, all doubt is removed from his mind concerning their accuracy. Sir John attacks me on a few points connected with the natives,

* 'Further Excavations at Zimbabye,' by Major Sir John Willoughby. Philip & Son.

but again he appears to have read my statements inaccurately. "Mr. Bent," says Sir John, "refers to the word *piccanini* as a term of native origin . . . *piccanini* is not a term proper to the native dialects, but one which was introduced by the white man and adopted by the native." On the contrary, I say ('Ruined Cities of Mashonaland,' p. 58), "Anything small they term *piccanini;* the word is universal and points to intercourse with other continents." Again Sir John quarrels with me because I call *Muali* a god, whereas Sir John says "it is a spirit." The solution of this disputed point had perhaps better be referred to the missionaries. Sir John also disputes the altitude of Fort Victoria as given by Mr. Swan, preferring the value 3600 feet to 3200 feet. Mr. Swan writes that he confidently hopes to do some more work at the ruins after the present troubles are over and the rainy season past. J. Theodore Bent.

FORMOSA.

A Foreign Office Report (Commercial No. 11 (1893)), "On the Island of Formosa, with special references to its Resources and Trade," has been written by Mr. Hosie. It is a document of very great value geographically and commercially, dealing with the island as a whole; and it reaches us together with a series of photographs of native types, and a new map of Formosa.

The island is now an independent province of the Chinese Empire, the governor being directly responsible to the central government. The governor resides at Tai-pei Fu, in the north, and the island is divided into three prefectures—those of the north (Tai-pei Fu), south (Tai-nan Fu), and centre (Tai-wan Fu). The railway which was commenced some years ago with the intention of connecting the western part of the island with the port of Kelung, on the north-east, has never been actually open along its whole length, but it is being pushed towards the south, where there are prospects of a better return, and the new administration of the province is pursuing a wise and economical industrial policy

Data are still wanting to construct a complete physical geography of the island; the composition of the high axial range which runs from north to south and culminates in Mount Sylvia (11,300 feet) and Mount Morrison (12,850 feet) is still unknown. Throughout the island there are immense carboniferous deposits. At some remote period, the plain in which Tai-pei lies was the bottom of a lake, until the pressure of the water burst the barrier of the three connected spurs of the Ta-tung Shan and Kuan-zin Shan, which rise to a height of from 1700 feet to 2800 feet. Artesian wells have been sunk in this plain to a depth of 200 feet, through strata of clay, sand, shells, and gravel. In the north-east of

the island numerous sulphur springs occur where sulphur is manufactured; on the Kelung branch of the Tamsui River there are many geysers; while in the south, coral limestone with oyster shells at an elevation of 2000 feet point to volcanic upheaval at no very distant date. The west coast of the island is fringed with mud-banks deposited by the numerous mountain streams. While the land is thus advancing seaward on the west, the east coast is rockbound, and resists the attacks of the sea.

The island, which measures about 236 miles long, and from 70 miles to 80 miles across its greatest breadth, has no large rivers except the Tamsui, in the north, at the mouth of which a sand-bar prevents large vessels from entering except at high-water. The harbour of Kelung, the north-eastern terminus of the railway, is the best in the island. Takon Harbour, in the south-west, is now silted up, and has been abandoned for An-ping, farther north, the port of Tai-nan, which, however, is liable to be swept by typhoons.

The vegetation is more markedly tropical than that on the opposite mainland, and includes plants and trees which are not found in continental China, such as the rattan and betel-nut palm. These may have been carried from the south by the Kuro Shimo (the Gulf Stream of the Pacific), which runs along the east coast. This is the more likely because the rattan also grows in Hai-nan, midway between Formosa and the Malay Archipelago, where it is indigenous. The insects, too, resemble those of Hai-nan and the Malay Archipelago, and it is possible they have been carried to Formosa by the prevailing winds.

Mr. Hosie gives an abstract of the meteorological conditions at Tamsui for each year, from 1887 to 1891. The minimum temperature recorded is 40° F. in February 1888; the maximum 100° F. in June and July 1888. The mean temperatures are not given, but the *minima* are over 60° F. from May to September each year; and the *maximum* of no month is under 71° F. The rainfall is irregular, varying 0·38 inch in June 1887, to 17·49 inches in June 1888, and 17·29 inches in September 1891. The figures do not show any regular rainy season. The total annual fall for each of the years reported on was 66·80, 75·28, 75·63, 75·34, 86·40 inches, an average rainfall for the five years of 75·9 inches.

The Chinese did not reach Formosa until after Europeans had been established as traders for some seventy years in possession. It is difficult to discover traces of the aboriginal inhabitants, but probably they were the ancestors of the "Pepohwans," or "savages of the plain," and the uncivilised savages of the mountains. These are of a Malayan type, but in many respects their appearance suggests intermixture with the people of the northern Japanese islands. The Chinese population of Formosa is between two millions and three millions, but no idea can be formed of the numbers of the savage tribes.

In a tribe visited by Mr. Hosie in 1892, on the Sintian branch of the

Tamsui River, the Japanese characteristics were very pronounced. The men were tattooed with a single vertical blue line down the middle of the forehead, and a similar line from the centre of the under lip to nearly the middle of the chin. The children were not tattooed, but the women presented a grotesque appearance, having tattooed designs on both upper and lower lips, extending across the cheeks to the ears in a narrowing blue line. The natives of Formosa were probably carried by storms from various islands of the Malay peninsula, their language showing marked Malayan affinities, and evidence of the practice of head-hunting being also forthcoming. Within the last twenty years a native of the Phillippine Islands was drifted by a storm to the north-east coast of Formosa, where he landed and settled down, thus proving the reasonableness of this process of involuntary migration.

The soil yields all sorts of vegetable crops with unparalleled profusion, and there are two harvests annually of rice and sweet potatoes, which are the chief food products. Mr. Hosie enters with some detail into the various textile, oil-producing, and medicinal plants of the island. These are very numerous, and as yet neither natives nor foreigners have taken anything like full advantage of the abundant resources which the forests afford. The main industries are tea-growing, sugar-raising, camphor and sulphur extraction. Coal exists in many parts of the island, but the coal-trade of Kelung is almost at a standstill, through the vacillating policy of the provincial government, and their scant encouragement of foreign methods. Traces of gold have been discovered at various spots, but no auriferous reefs have been as yet struck, and the gold is derived entirely from washings.

Almost the entire output of Formosa tea finds its way to the United States. More than half the sugar goes to Japan, and the rest to other Chinese ports and Hongkong. The camphor goes to Hongkong, whence it is sent to Europe. The trade of the island is capable of great development.

JOURNEY THROUGH CENTRAL MANCHURIA.

By the Rev. J. A. WYLIE.

In the months of September and October last year (1892) I took a journey through Central Manchuria. My object in taking this journey, for which I applied for and obtained leave of absence from my station for two months, was twofold: first, to obtain a little rest from the usual routine of work, and secondly to acquire a little more knowledge of the general features of the country, and of the situation, size and relative importance of the cities and towns in that part of Manchuria. The journey lasted from September 6th until November 10th, fully nine weeks; the distance travelled was 4450 Chinese miles (or li), being equal to about 1480 English miles. The route chosen was northward through Mukden and Zieling to Kai-Tuan, thence north-east to Kirin, thence north to Ashi Ho, eastward to Pin Chu, north-

ward to Pa Zen Su, and Pei Yuan Sin Zu (this last being my farthest point north); thence turning south-west I proceeded to Hu-Lan, from Hu Lan to Shvang Cheng Pu, thence westward to Hsin Cheng (or Petuna), thence southward to Kuan Cheng Tzu and south-west to Fa Ku Men and Hsin Men Tun. From that I turned away west to Hsin Li Tun; then I took a circuitous route to Kuang Ning, visiting the small Lama Tung and the large Lama Tung (which are two important Lama temples in Mongolian territory near the Manchurian frontier); from Kuang Ning I went west to I Chu, and then south to Chin Chu; from Chin Chu, in a south-western direction, to Tien Chuang Tai; thence turning north I came back by way of Newchwang to Liao Tang.

The change of temperature experienced during the two months was most marked. When I started from Liao Tang the daily temperature was about 70° Fahr. min. and 80° Fahr. max.; when I reached Kirin I found that what clothing I had taken with me was insufficient to keep me warm, and so I had to purchase two wadded Chinese garments, and this was on September 17th. This cold weather at Kirin proved to be somewhat abnormal, for as I went further north, I found that many of the crops had been blighted by frost owing to the unusual fall of temperature. Nevertheless the weather was rather to the cold side all the time I was in these northern districts: on October 30th, at I Chu in the south, it was not much, if any, colder than on September 30th at Pei Tuan Lin Zu in the north. Only when I had crossed the River Liao, returning eastward, and had reached Newchwang did a fierce northern blast begin to blow, and then being unprepared for it, I had to go to Liao Tang, the coldest ride I have yet experienced.

The roads, so far as Manchurian roads go, were remarkably good: when I left Liao Tang they were heavy, and only slow progress could be made: but a long spell of clear bright weather soon dried them up, and long before I reached Kirin it was very fine travelling, while on the great plain north of Kirin, and again on the west side of the Sungari coming south, long stretches of smooth level ground were traversed. Only after I left Chin Chu did I experience difficulty from the state of the roads. Rain had fallen very heavily on two successive nights and during part of the intervening day, and had made the ditches and pools of that low-lying district, at all times numerous and deep, more numerous and deeper still. Our progress for several days at that time was very slow; at times every carter would stand still for half an hour before venturing into a pool or ditch: several times we had to risk being the first to cross: while for two successive days, and for hours at a time, and that chiefly in the early hours of the morning before dawn, the clogging of the axle and wheels of the cart with the thick mud necessitated a stoppage every three or four minutes that the carter might put them right.

As my time was limited, and as my purpose was to get over a good deal of ground in that limited time, I did not delay in any of the cities or towns. With the exception of Kirin and Chin Chu I did not wait anywhere longer than a day. My usual practice was to make a circuit of each place either outside or inside (or partly outside and partly inside) of the walls, and to ride through several of the principal streets. This gave me a very fair idea of the extent of any town or city and of its general appearance, as well as of what constituted its principal industries.

The chief crops in the districts through which I went were the tall millet, four kinds of which are cultivated, the small millet, three kinds of which are cultivated, beans of several kinds, hemp of two kinds, cotton in parts south of Kai Yuan, rice chiefly south of Kai Yuan, potatoes more cultivated in the north and to the west of the Sungari. Indigo, wheat, barley, and opium are largely grown, but the ingathering of these for the year was over: the great extent to which flour is used and its unusual cheapness testified to the large cultivation of wheat. The hemp chiefly

grown is the slender variety, the "linen ma," and of this we saw in many places large fields one after the other: it is grown principally for the sake of the oil expressed from the seeds.

The cities and towns I visited were centres of trade for the surrounding country; many of them could boast of very large distilleries, inn-yards of great extent capable of accommodating hundreds of guests, and oil-works of various kinds; while outside their walls were generally some brick-kilns, brick-works and lime-kilns. The houses were chiefly built of brick; burnt brick was used for the better houses in the town, while unburned brick or mud only was used in the country. In some of the cities the shop-fronts were quite imposing, being substantially built and lavishly decorated. The streets generally were wide and level. I saw nothing of the immense activity which characterises these cities during the winter months, when all the inns are full and the shops doing a good trade, when from the south come great numbers of men seeking employment, and the rush of men and the succession of carts is continuous. The streets were only moderately busy, the inns were almost deserted; it was evidently only a "waiting" season. And as in the cities there was no stir, so neither was there stir in the country, at least on the roads. There was moreover, nothing of goods traffic by means of large carts, and very little by means of small carts: more than half of the large inns open in the winter had closed doors for the summer, and at times this gave one the impression of deserted villages.

The scenery was varied: at first we had well-wooded hilly country, with mountains to the east; north of Kirin it became less hilly but still undulating, enabling one at times to get a magnificent view of the vast plain. North of Ashi-Ho the plain got very monotonous; round by Hu-Lan, Pei Tuan Liu Tzu, Shvang Cheng Pu, Petuna, was only the dead level plain: fine open country, it is true, but no prominent objects making a near or distant horizon. The Mongolian plain south of Petuna was more undulating, while south of Kuan Cheng Tzu, we came again to the well-wooded regions. In the parts round Kuang Ning I Chu and Chin Chu we have light soil, and vast sandy wastes, but volcanic rocks, and ranges of hills and mountains give beauty and grandeur to the country. It did not fall to me to see the beautiful scenery on the banks of the northern Sungari; that beautiful scenery must be farther down the river. The northern Sungari where I crossed it had no high banks, and the trees on either side of it were by no means plentiful or umbrageous. It is the southern Sungari at or near Kirin that flows through a finely-wooded country, with hills in all directions. At Kirin the views on both sides of the river were very picturesque: on the south of the river were parks well studded with trees, with hills in the distance; while north of the river were the piles of timber (so prominent a feature of Kirin) and the city itself in the foreground, and beautiful hills with temples situated in romantic dells in the background. The houses by the river-side rest on little perpendicularly placed blocks of wood, as indeed do also some of the streets, while nearly all the houses are more or less built of wood, and the streets are laid with wood. The walls of Kirin are only 9 or 10 feet high, of no use for purposes of defence. The city inside the walls has a reputation for extraordinary filth, but concerning this I can bear no trustworthy testimony, because the soil was then dry, and stagnant water was not common. Only in two or three places did I notice what might be called cesspools. The Kirin streets are narrow, and so blocks of traffic must be frequent.

About 55 li west of Kirin on the road from Mukden, as well as on the road from Kuan Cheng Tzu, is the village of Ta Shin Ho, where Dr. Greig was attacked the year before last. I took a mid-day meal at the inn where that sad incident occurred: on entering the inn-yard, I heard one or two boys saying that I was

Dr. Greig, but when I went into the room, they soon found out that they had been mistaken. The inn-people were most friendly, and they evidently regretted that there had been such an occurrence as above referred to in their inn at all.

On the same day as that on which I was at Ta Shin Ho, indeed only shortly after leaving that village, I came to the Lao Te Ling, a charming place: the hill was steep, but at every turn of the road, there was something beautiful met the eyes. At the summit there are several fine temples, including one, a large Buddhist temple, in course of erection; and in connection with this there is an interesting story. In a little house with 8 feet by 6 feet of accommodation, two-thirds of which is occupied by a small Kang, there lives a Buddhist priest. His head is not close-shaven, as the heads of other Buddhist priests are, for since taking up his residence in these quarters, or rather in this sentry-box, he has allowed his locks to grow. For four years has he already been here, and another three years at least remain for him to stay. He is seeking to attain perfection, and he must finish what he has begun. Not until the temple is finished building will he be at liberty to leave his post.

The little door of this priest's domicile is sealed up, so he never even steps out into the open air; there is only a small opening in the door or window for an attendant to hand in his meals. These meals are scanty and few: only one meal a day at noon. He drinks great quantities of tea, however: he seems to put no limit to his indulgence in that beverage. In sleep he does not stretch himself out: in fact he never lies down, he only half-reclines, and asleep or awake, he constantly keeps pulling away at a rope which connects with the temple bell, which must never cease to ring. Travellers passing at all hours may hear the bell sounding; this is part of his work of merit.

While I was with him, even although we spoke in such a way that everything else might be forgotten, he did not forget to pull the rope. How, during sleep, he manages is to me the mystery. He had heard long ago of the Christian religion; some books I offered him he refused on the ground that before he had purified himself by completing his task, it would be sacrilege to touch these books. When I pressed him he accepted them, however; how earnest must this man be when he thus denies himself; still it is merit, and merit for himself that he is endeavouring to attain.

Entering Kirin I saw a ghastly exhibition; two days previously more than forty men had been executed publicly, and their heads were now hanging up on trees in a park, specially used for that purpose, on the right-hand side of the road. This was the other side of human life from that seen in the Lao Te Ling priest.

At Hsin Cheng I had a new experience; there I first saw the Mongols in considerable numbers. Crossing the ferry from Hsin Cheng to Mongolia we were thrown a long time on each other's company. Many of them speak two languages: for the purposes of trade they require to know Chinese. They are freer in some ways than the Chinese; there is not so sharp a distinction of classes; literary men and magistrates often engage in business, so do the Lamas. The magistrates wear very large fancy hats, which get very shabby-looking in the case of those who do buying and selling as ordinary merchants. Many Mongol priests were to be seen with their yellow and purple garments. They were very energetic and bright. The Mongols as a race, as is well known, are given much to the rearing of cattle, especially horses. Packs of horses were constantly overtaking me from the west and north-west while I was going south. On several occasions I stayed for the night in an inn kept by Mongol proprietors; on these occasions I noticed that the Mongols were greatly given to gambling: all night long did they continue card-playing with their cash beside them.

The Lama temples were interesting. South of Hsin Cheng (80 li) we came to the first one; it was situated at a distance of 6 li from the main road, and being built on an eminence and gorgeously decorated with golden colours, glistening in the sun in fine contrast with the red and white wash, it presented a striking effect. It comprised three separate blocks of buildings of two storeys each; it was only when one stood actually at their base that the grandeur of the structures became somewhat less in one's eyes. Each erection had eighty-two small "chien," in addition to a tower of moderate height. I could not induce any of the priests, superiors or inferiors, to open the temple doors to show me the interior. "The key was in the possession of the custodian, who had gone away to a neighbouring village for half the day." Eight li south of this place was the residence of the Mongol prince of that part of Mongolia; it was beautifully situated in a finely wooded glade. The prince's residence was in external appearance just like a rich Chinese landlord's. On each side were the houses of his retainers. The Mongol land is more or less reserved for the Mongols: only under certain strict regulations are Chinese allowed to purchase or mortgage. Several years ago when purchase was made easier for a time a good deal of land was bought by Chinamen.

At a village called Huo Shih Ling Zu, 180 li north of Kuan Cheng Zu, we were near the native home of the Manchurian lark. Even at that village the birds brought a good price. Of other Lama temples that I came to was one, 120 li south of Mai-Mai-Kai, at a place called Ka Hsia, where are eighty priests. But the great district for these Lama temples is more to the south-west, near Hsia Li Zun, immediately outside the boundaries of Manchuria. They are all built in the same style, washed with red and white lime, each structure having eighty-two chien, but in connection with one establishment there being often many buildings. Strange to say at Hsin Li Zun, only 70 li distant from one of the principal groups, I could gain no authentic information anent that group. Only one man out of all whom I met and enquired of in the inn had traversed the road which passes near these temples. I had to enquire the way as I went forward every 10 or 20 li. From Hsin Li Zun I went north-west to Ma Ling Zu (10 li): there I inquired, and then made for Lu Li Cho, north-north-west, 15 li. After taking some lunch at a small inn there I started for the small Lama Tung temple, 5 li off. From the small Lama Tung I made for an inn 25 li to the south, viz., at Yang Ke Tun, and there I arranged with the innkeeper as to what should be done when my cart came, and also left instructions as to the movements of the cart in the event of my not coming back to the inn that night. Thereupon I set out for a large temple which was said to be 20 li off, but which I found to be 30 li.

I reached this temple, called the Ta Lama Tung, at five in the twilight. Long before reaching the Tung, or the settlement, for such it was, I saw the buildings glistening in the setting sun on the slope of the hills. In the far distance it seemed like a fishing-village at home, the hillside dotted with white spots, larger and smaller, at unequal distances from each other. The large buildings (or temple precincts proper) were painted white in their lower storeys and red in their upper storeys. When my approach was observed as I slowly led my pony up the steep hill, about four hundred Lamas crowded about me. These Lamas were very inquisitive to know what was in my pockets. I answered their questions in a way more or less satisfactory to them. Having talked a good while with them, the darkness coming on, I asked if I could be accommodated in some of their houses for the night, as there was a distance of 30 li to my inn, and the road was very bad. They could not entertain any idea like that of my staying there for the night. They made various objections, amongst others saying, What if my horse was lost? There is no yard in which to tie him

up. At last, after many endeavours, I began to think that they could not be induced to change their attitude, so I began slowly to move away, intending to go back through the darkness to the inn at Yang Ke Tun. As I descended the hill, however, one of the priests who had been at first most opposed to my staying was suddenly influenced to take a different view of the situation, and began urgently to invite me to stay in his compound for the night. I hesitated, and asked him the reason of his new move. When we had gone a little farther we met another priest, and him this priest urged to invite me to his house. He did so, and stated at the same time that he had a compound where my horse could be attended to. This invitation I accepted, and he led me to a very good compound, which turned out to be not that of the man who gave me the invitation but that of the treasurer of the temple funds and manager of the commissariat department, by name Wu. He had several horses of his own in his yard, which were well-fed and attended to. His house was a good one, the guest-room being very neat and clean. A great number of priests, young and old, followed me into his house. Mr. Wu bade his attendants bring me food, and I fared very well indeed. Among other things black tea was presented, the Mongols using the black tea, and not the green tea of the Chinese. We had a good hour's talk together; he was a very pleasant companion in conversation, but was rather unpleasantly forward in his way of handling one's personal belongings. My riding-whip he wished to keep in exchange for one of his own, which he straightway brought into the room for that purpose. My watch he was very anxious to possess as a "keepsake" from me. And so with some other things. In fact it was with the utmost difficulty I could get him to give up his pursuit of these objects: at last I had practically to say "hands off."

My resting-place for the night was not the most pleasant: it was at the cold end of a kang on which were many Lamas of inferior rank. Had the Lamas in these temple grounds any idea of doing injury to me or robbing me of anything, that night was their opportunity. Next morning my host, according to promise made the previous night, sent a little boy to lead me to one of the halls where they were chanting. In all there were seventy priests chanting at that service besides some acting as attendants. They chanted in rather an orotund voice, not at all in the falsetto of the Buddhist priests I had previously heard. Those attending were very careful to see that I did not cross the threshold of their temple, but from the door I saw and heard everything that was going on. Their service lasted for about three quarters of an hour. After the chanting I was invited by another Lama to go to his house and have breakfast. I accepted his invitation, and afterwards started on horseback for the inn I had left the previous afternoon. The Ta Lama Tung has at least one thousand five hundred priests. One hundred li west of it is the Fo Lama Shihi with four thousand priests.

I had one very hard day's ride. This was from Kuang Ning to I Chou. I started at midnight going south-west down the imperial road for 40 li in the dark. Oftentimes I lost the track and directed my course by a star. Having gone these 40 li my route lay over the hills, but shortly ater leaving the highway I lost my road; clouds had arisen, I had no sun and no star to direct my course, and backward more or less I went for 15 li. I stopped at an inn or two for food, but either no food was to be got or the crowds of curious onlookers were too many, so (with all good wishes to these crowds of onlookers, for it was a beautiful morning after the sun rose and the pleasant company of some wayfarers I met made me enjoy the journey) I went on and on until at twelve o'clock I found an inn where they soon prepared food, having had a ride almost continuously from midnight until noon, and gone 115 li. Afterwards I went 35 li into I Chu, 150 in all that day. The following day I had about 100 li to Chin Chu.

Let me add a few remarks in reference to the towns visited:—

Kai Tuan is rather a busy place: it boasts of a pagoda of a good height. Our preaching-chapel is well-situated on the east street.

I Tung Chu is a large village, or small town, 280 li south of Kirin.

Of Kirin I have already spoken. In that city not far from the governor's residence is the dispensary opened by Dr. Young last spring.

Two hundred and sixty li north of Kirin is a large village called Ku I Shu, where is an out-station of the Irish Mission.

One hundred and thirty li still farther north, is La Lin Tsang, a very busy market town, situated near the La Lin River.

Going another 40 li we came to Ashi Ho. This town has mud walls: is rather irregularly laid out but has a fair amount of business.

Pin Chu, 130 li east has also mud walls: in addition its walls have a parapet of brick. Ground is more plentiful in this town, and so large compounds are to be seen in it mostly those of distilleries. The east part of the town is on the slope of a hill, and so from the east wall a fine view can be obtained of the town and the surrounding country. To the immediate east are hills of some size.

One hundred li to the north is Pa Yen Su, a larger place than Pin Chu, but much like it in general characteristics.

One hundred and eighty li farther north (less as the crow flies) is Pei Tuan Lin Zu, still larger than Pa Yen Su. This town has a mud wall like the others: it lies on a wide open plain. Its streets are broad and are ornamented with some fine pawn-shops and other imposing frontages.

One hundred and seventy li south-south-west of Pei Lin Zu, and more than 100 li west of Pa Yen Su, is Hu Lan. This town has no walls; consists chiefly of one main street, which boasts of a large market-place and large shops gorgeously decorated not a few. The ferry over the Hu Lan River just at the south end of the town is a very busy institution.

One hundred and fifty-five li by road south-west of Hu Lan on the south of the Sungari and 130 li west of Ashi Ho, is situated Shuang Cheng Pu. This town encloses within its walls a larger area than any of the northern towns previously mentioned; it too has mud walls: both inside and outside the walls the ground is very level, so that there is no possibility of a natural drainage of the water. The moat outside contains only stagnant water. The main streets are wide, the cross is very busy: the inns are numerous and remarkably large.

Hsin Cheng or Petuna (the proper Petuna is 30 li further north), is 260 li west of Shuang Cheng Pu. On the south and on the west of it flows the River Sungari, which is there very wide but shallow. Two ferry-boats ply, one belonging to the Chinese magistrate and one belonging to some Mongols. Each boat makes one run hither and thither in the day. At Petuna there is evidently a large trade carried on between the Chinese and the Mongols. Its walls are low and very irregularly built.

Kuan Cheng Tzu is situated 240 li to the west of Kirin and 345 li south of Petuna: it is a very busy place: there is one large north and south street, and several large east and west streets, the first east and west street being close to the southern wall, the second parallel to this, but farther north, and similarly with the third and the fourth. On the north and south street, and on the first east and west street, are very large shops, and altogether a large business must be carried on. The south gate is a busy market-place. The other streets are rather irregularly laid out, and the walls round the town are quite unworthy of the name of walls, being of mud, running in no regular direction, and in many places presenting large gaps. At

Kuan Cheng Zu are the residences of the Irish missionaries, Mr. Carson and Dr. Greig.

About 80 li south of Kuan Cheng Zu is the watershed of the rivers flowing north and those flowing south. Within a radius of 200 li of Kuan Cheng are some of the largest and best-equipped Chinese inns I have seen; had I kept to the main highway going, I would have seen more of these fine inns.

Fully 300 li south-west of Kuan Cheng Zu, is Mai Mai Kai, a busy place but of no pretensions otherwise. It has four principal streets, a north, a south, an east, and a west street, which together form a square; the north street forming the northern side of the square, the south the southern side, and so with the eastern and the western. Mission-work goes on quietly.

Fa Ku Men is about 500 li south-west of Kuan Cheng Zu; if Kuan Cheng Zu is irregularly laid out, Fa Ku Men is still more so. It is situated on somewhat of a hill, and has no walls, except at its northern end, where is the boundary gate into the Mongolia territory, and where custom is levied. It has two main streets, both of which run north and south; these streets are rather narrow. The Irish mission have a chapel here, situated in a most desirable place.

One hundred and sixty li south-south-west of Fu Ku Men, and at an equal distance west of Mukden, is Hsin Men Tun. This town has one large central east and west street 10 li long, and two small streets running parallel, one on each side, to the large street. It has a good trade and would be a most prosperous place, were it not for the fact that the surrounding country is year after year flooded by the Liao River, and the crops are ruined, and the farmsteads washed away. Last year a large district was washed by these floods, and many families reduced to absolute poverty, while others suffered greater loss. A better situation for a chapel could hardly be than that chosen by the Irish mission in Hsin Men Tun.

Hsin Li Tun is a small but important place west-north-west of Hsin Men Tun. The people there were not very courteous in their treatment of guests, shouting, reviling, and throwing mud when one appeared on the streets.

About 120 li south of Hsin Li Tun is Kvang Ning: it is fairly busy in its main street, but otherwise had a leisurely appearance. Within the city walls to the north-east is an eminence on which is built a very fine temple (a Niang Niang temple), while outside, at no great distance, is a peculiar rectangular hill, on which is also erected a temple, in red sandstone, of very picturesque appearance. Not far from the Nath gate, within the walls, is a double pagoda, not high but in good repair.

On the other side of the high range of hills, to the west of Kvang Ning, is I Chu. This is not a very busy place, the shops being small, and the streets irregularly laid out; it has a very high pagoda.

Ninety li south is Chin Chu; it is a compactly built town, with narrow streets and high walls. Its area is much less than Liao Tang, but what area it has is more densely populated. But to my mind it cannot have so large a population as Liao Tang. Its pagoda is a prominent object, being seen at a great distance off. About 20 li from the city you reach the base of high hills. The mission buildings, though situated on a space of ground between two comparatively quiet streets, are yet at one point within 100 yards of the great street leading to the east gate.

About 200 li south-west of Chin Chu is Tien Chwang Tai on the right bank of the Liao. Formerly this place was the port for the interior, before Ying Kov took its place as such. Much native craft still comes here.

The town of Newchwang is Goli, north-east of Ying Kov. It is a poor-looking

place, has a low mud wall enclosing a few houses; but outside the wall is the real Newchwang, which is by no means large. The principal object in the landscape is the tower of the Roman Catholic church. The Roman Catholics have many mission stations scattered here and there over Manchuria. To the east of Ashi Ho between Ashi Ho and Pin Chu, at Pa Ya Su and Pei Tuan Lin Zu, they have establishments, between Petuna and Kuan Cheng Zu they have one or two stations, and again south of Fa Ku Men, several stations in their country districts.

HAUSA PILGRIMAGES FROM THE WESTERN SUDAN, TOGETHER WITH A NATIVE ACCOUNT OF THE DEATH OF GENERAL GORDON.*

By the Rev. C. H. ROBINSON, M.A.

Mr. Robinson said there were not improbably some present to whom the word Hausa, whether as applied to a people or to a language, conveyed but very little distinct meaning. They would, therefore, be surprised to hear that Hausa might claim to be the second most widely-spoken language in Africa, being spoken, in fact, by no less than fifteen million people, *i.e.*, by one per cent. of the whole human race. The comparative neglect with which both the Hausa language and people had been treated in the past, as well as the immense influence which they seemed destined to exert upon the future of Central Africa, must be his excuse for consenting to read a paper after such a very brief study as he had as yet been able to make in Africa, whether of the people or of their language.

Before passing to the more direct subject of this paper, he might, perhaps, pause for a moment to remind them of the exact locality and extent of the country inhabited by the Hausa people. Besides being, as it was, a sort of *lingua franca* throughout the whole of the western and central Sudan, being understood sufficiently for purposes of trade and travel from the Niger and Binue to the Mediterranean, and from the Gulf of Guinea to Khartum, it was the distinctive language of the Hausa race proper inhabiting the country which stretched from a little above the junction of the Niger and Binue to the south border of the Great Sahara. As compared with the tribes by which they were surrounded, the Hausas were a highly-civilised race. Living in strong, well-built cities, they manufactured large quantities of native cloth, leather, paper, shoes, etc., which, together with palm-oil and spice, formed the staple articles of the trade which they carried on throughout the whole of the Sudan. Small outlying colonies of Hausa people were to be found in Alexandria, Tripoli, Tunis, and almost all the towns on the African coast of the Mediterranean.

The language spoken by the Hausa people, which possessed an alphabet and a literature of its own, the alphabet being a modification of the Arabic, was radically distinct from the other native languages by which it was surrounded. It resembled Coptic from the fact that whilst being itself probably non-Semitic, it had borrowed its whole pronominal system, and a large part of its general structure, from a clearly Semitic source.

It was during the course of a journey, from which he had recently returned, along part of the southern frontier of Tunis and Algiers, near the northern border of the Great Sahara Desert, that his attention was directed to the subject on which he had been asked to read the present paper. It was difficult to over-estimate the far-

---

* Paper read at the Nottingham meeting of the British Association, September, 1893.

reaching results, on the life and habits of the great Hausa race, of the command addressed by the Prophet in the Koran to all his devout followers to make the pilgrimage to Mekka. The efforts which were constantly being made by tens of thousands of the population to fulfil this supposed obligation produced a sort of arterial circulation throughout the whole of the Sudan, starting in some instances from places as much as 3000 miles distant from Mekka.

During the course of the journey above referred to, a journey which he made for the purpose of ascertaining by direct intercourse with the natives the possibility of crossing the great Sahara in order to reach the Hausa States which lie to the south of it, Mr. Robinson had with him as servants and camel drivers two Hajis, namely, men who had successfully accomplished the pilgrimage to Mekka, both of whom were Hausas. The story of his life, which the father of one of these Hajis, himself a Haji, dictated to him in Hausa, might, perhaps, prove interesting as illustrating the difficulties and adventures which the pilgrims not unfrequently met with in the course of their protracted journeys.

The author, Abu Bekr by name, a native of Bida, a town of about fifty thousand inhabitants, 150 miles north-west of Lokoja on the River Niger, set out with several of the members of his family, a party of seventeen in all, and proceeded, in the first instance, to Kuka, on Lake Chad, whence, after a stay, or rather detention, of four months, he set out, *viâ* Wadai and Darfur for Khartum. Whilst passing through Wadai, he and his party were captured and treated as slaves for about a year; but having eventually regained their liberty and part of their property, on the plea that they were pilgrims bound for Mekka, they at length reached Kkartum, or rather Omdurman, opposite Khartum, shortly after the taking of the city and the death of General Gordon.

The following is a literal translation of the account which Abu Bekr gave of the taking of the city and the death of Gordon, being the version current in the Mahdi's camp. It differed, as would be seen, in one or two important details from the accounts hitherto published, especially with regard to the amount of resistance which was encountered by the Mahdi immediately prior to the taking of the city. The translation, as they would see, was rough, his object being to preserve the idiomatic expressions of the original.

"On the day of the taking of the city, fighting went on from early morning until evening without ceasing. Many of the Pasha's men were killed, and many of the Mahdi's men were killed, until the evening came, till late at night. As the Pasha's men were resting, some of them went to the place of the Mahdi. They said to him, 'We are tired, we have had no rest to-day; do you give us something to eat; if, then, you will come to the place where we are in the evening, the Pasha, he will run away.' The Mahdi said, 'It is well, but how shall we take the place?' They said, 'Only come and fight.' The Mahdi gave them goods. He said, 'Stay in my camp if you will, or go to your own place.' They rejoiced; he gave them a cow, it was killed for eating; he gave them a camel, it was killed for eating; he gave them much money. He said, 'It is well; he (*i.e.* the Pasha) shall not sleep before we take the city, by the help of God.' Then he arose in the early dawn. He took soldiers. They went to the east of Khartum. They sat down there. Others, they went to the north; they sat down there. Others went down near the river; they sat down there. The Mahdi himself, he went towards the south. He rose up, a drum was beaten, a trumpet was blown; they all then arose and went towards Khartum; the men of Khartum, they rose up, a fight began, this man and that man each fired his gun, they fought until the evening, but they were not able to enter into the town; in the evening they ran away. Many of the Mahdi's men were killed. The Mahdi rose up. Three times

he exclaimed, 'O God, O God, come!' He uttered many charms; he prostrated himself twice. All his men saw this; the fight went on till the early dawn. In the darkness the Mahdi entered into the city; no one saw him. When the men of the city saw him, they said to the Pasha, 'The Mahdi, he has entered into the city.' The Pasha said, 'Where is he?' The Pasha's men, when they heard it their hearts fell within them; they threw away their guns. About twenty men were caught; they fell down, they died. One was cut, another pierced with a spear. He did not see who it was who pierced him. Some men were seen up above; fire was seen in the place, the men of the city they all ran away. The Pasha, he said he would not run away till he was captured. He was struck with a gun; he was pierced with a sword and a spear; he was struck with a stone. The Mahdi had said, 'He must not be killed, he must be brought before me; men do not kill a king in war.' When the Pasha said he would not go to the place of the Mahdi, all the Mahdi's men struck him. The Mahdi, when he heard it, said, 'Let his head be brought.' It was cut off, his body was thrown into the river. When his head was brought to the place of the Mahdi he said, 'Close his eyes.' He said, 'You have done a wicked thing; why did you kill him?' He was angry; he rose up, he returned to his camp in the evening."

Abu Bekr, after with difficulty escaping from the camp of the Mahdi, who wished to detain him as a soldier, proceeded on his journey to Mekka, through Abyssinia, where he was detained for a whole year, arriving at length at Sawakin. From Sawakin he went by steamer to Jidda, and thence by land to Mekka. Having performed the rites of the pilgrimage, which occupied a month, he found himself without any resources wherewith to continue his journey. He was consequently compelled to remain for four years at Mekka, at the end of which time, having replenished his own resources from those of subsequent pilgrims, he returned to Jidda, and went by steamer to Suez. From thence he walked to Alexandria, and came by ship to Tripoli. Having spent some considerable time in collecting money, chiefly by the sale of charms, to enable him to continue his journey once more, he has just now started with those who still remain of his original party to complete his return journey to Bida by crossing the Great Sahara Desert, a distance of somewhat more than 2000 miles. Should he meet with no unforseen obstacles, he should reach his home in about a year's time, and will then have completed a journey of nearly 7000 miles, chiefly on foot, in about nine years.

The above story was only one of several which Mr. Robinson had himself met with, and might be paralleled by hundreds of others more or less similar. His purpose in giving it thus in detail was to afford an illustration taken, so to speak, from life, of the important part which these pilgrimages to Mekka from all parts of Central Africa, and more especially from the Hausa States, had played in the past, and were destined to play in the future in the history and perhaps gradual civilisation of the people concerned.

The chief object of Mr. Robinson's recent journey in North Africa had been to ascertain the possibility of crossing the Great Sahara Desert from the north in order to reach the Hausa States, which lie to the south of it. The two possible routes by which such a journey might be attempted start, the one from Tripoli, and the other from Tunis. The former is at present closed to Europeans by the persistent refusal of the Turkish authorities to allow anyone to penetrate inland to a distance of more than 10 miles from the town of Tripoli. The second, since the massacre of the Flatters expedition by the Tuaregs, is scarcely more practicable. Mr. Robinson is accordingly proposing to go out to the River Niger, and after ascending this river as far as Lokoja, to start thence overland to Kano and Kachina, two of the principal towns of the Hausa States, the former, according to native accounts, containing a

population of one hundred and twenty thousand. After spending a few months at each of these places, he would hope to go on still further to the north, and, crossing the Great Sahara, to arrive at length at Tripoli, the distance in all from the mouth of the River Niger to Tripoli being about 2600 miles. The exact journey which it is thus proposed to attempt, does not appear to have been made by any European traveller, though the northern portion of the route, *i.e.* from Tripoli to the neighbourhood of Kano, has been traversed at least three times within comparatively recent years, viz., by Dr. Barth, 1850-55, by Dr. Nachtigal, 1868–73, and quite recently in the reverse direction by Captain Monteil, the two former being of German and the latter of French nationality. One of the principal objects of the proposed expedition will be the collection of specimens of native Hausa literature and the study of the dialectical differences existing in this language with a view to the eventual publication of the New Testament. The Hausa tribes profess the Mohammedan faith, which has been outwardly imposed upon them by conquest, but they are for the most part entirely free from the bigotry and fanaticism which characterise the East Sudan. Moreover, their great eagerness to become possessed of books, a man's wealth in some parts being reckoned by the number of books he possesses, renders it probable that if the New Testament could be produced in a form exactly similar to their own books, printed perhaps on their own paper, it would at once obtain a circulation by means of the native caravans throughout a great part of the Western Sudan. While this is one of the objects contemplated as the result of Mr. Robinson's expedition, he will be prepared to observe the country in which he will be placed, as well as the people who inhabit it; so that his scientific results are likely to be of some importance.

The Hausa Association,* for which Mr. Robinson is going out, has issued an appeal for £1600, the estimated cost of the proposed expedition, of which, up to the present time, only £800 has been as yet received.

THE MONTHLY RECORD.

THE SOCIETY.

The New Session.—The Session of 1893–4 will be opened on Monday, November 13th, when the President, Mr. Clements R. Markham, C.B., F.R.S., will give an address on what remains to be done before the Earth is completely explored, and on some of the great geographical problems that still remain to be solved. The second night of the session will be devoted to the subject of Antarctic Exploration, when Dr. John Murray will read a paper indicating what is our present knowledge of the region and the best method to be pursued in order to increase that knowledge. It is hoped that a thorough discussion of the whole subject will follow. Several other important papers are in hand or have been promised; one of the most interesting of these will be Dr. J. W. Gregory's

* The Hon. Sec. of the Hausa Association, Rev. J. O. Murray, Emmanuel College, Cambridge, would be pleased to forward to members of the Royal Geographical Society further information in regard to the proposed expedition, or to receive any contributions towards the same.

account of his adventurous journey of exploration to the glaciers of Mount Kenia, from which he has just returned. The other subjects likely to be brought before the Society during the session will be seen from the programme which accompanies this number of the *Journal*.

Mr. Mackinder's Lecture on Geography and History.—Mr. H. J. Mackinder will give the second course of his series of lectures on the relation of Geography to History, early in the new year, beginning on the second Friday of January (the 12th). The general subject and the titles of the various lectures will be found on the programme accompanying this number.

Dr. Mill's Lectures on Geography and Commerce.—On Tuesday evening, October 3rd, the second course of the Society's Educational Lectures was commenced in the theatre of the London Institution, Finsbury Circus, E.C. Mr. Clements R. Markham, C.B., F.R.S., President of the Society, in a few words expressed the hope that the new departure of the Society in providing a course of lectures on the principles of Commercial Geography in the City would be justified by its success, and introduced the lecturer, Dr. H. R. Mill. The attendance was very good, and has been maintained at the subsequent lectures. The first lecture was introductory to the course, and dealt with the definition of Commercial Geography and the share of Commerce in promoting geographical discovery. Geography as a whole was compared to a pyramid of six courses of masonry, built of blocks obtained from different quarries. The first and fundamental course, built of material derived from pure mathematics, was mathematical geography, absolutely secure and firmly established, underlying all the rest. Upon it, and resting on it, rose Physical Geography, the material for which was brought from physics, geology, meteorology, etc., all the determining conditions being fully known. This served as a foundation for Biological Geography, in which the imperfect comprehension of life introduced unstable and incomplete elements; but far fuller of uncertainty was the next tier of Anthropo-geography, in which the additional unknown quantity of human nature exercised a preponderating influence, and the positive scientific facts from the quarries of anthropology, ethnology, and economics were few and by no means well coordinated. Arising from this came the layer of Political Geography, the scientific basis of which was mixed up and overlaid with arbitrary, transitory, and inpredictable conditions arising from the workings of the human mind and the limitations of nationality. Upon this was reared the final storey of the pyramid, Commercial Geography, a mass of rubble, the relation of which to its scientific foundation is as yet by no means fully made out. Here individual self-seeking is superimposed on national exclusiveness, and the limits imposed by tariffs, customs, monopolies, competition and the like are in a continual state of flux. The object of the first

part of the course of lectures was to define the principles of geography, or the relations between the various elements of which the science as a whole is composed, with special reference to its commercial aspect. The second part of the course was designed to illustrate the application of geographical principles to specially-selected divisions of the British Empire. The stimuli to exploration by natural conditions compelling migration, by political aggrandisement, commerce, religious propaganda and scientific research were referred to, and an outline of the history of discovery was sketched, in order to show how large an influence commerce had in starting the great wave of discovery from the Mediterranean centre, which spread round the globe in the sixteenth century and revealed the true form and actual parts of the World. The state of our present knowledge of the Earth's surface was illustrated by a chart showing the degree of accuracy with which maps of the various regions could be drawn from existing surveys.

The Society's Educational Prizes.—The Council resolved last session to place the Scottish and Irish Training Colleges on the same footing as those of England. The arrangement with the Scottish Education Department has been completed. To suit the conditions of the examinations in Scotland, it was arranged to award the prizes on the basis of the paper in geography, set to pupil teachers and others who should be candidates for admission to the training colleges. The following names have been forwarded by the Scottish Educational Department as those of the candidates who stood highest in the examination of Midsummer last. Males:—1. Thomas W. Death, of Ferryport-on-Craig Public School; 2. Frank Duncanson, of Burntisland Burgh School, and Alexander Sinton of Govan, Stewartville Public School; 3. William R. McGregor of Aberdeen, Frederick Street Public School, and William McC. Wightman of Kirkbean Public School. Females:—1. Mary J. Milne of Aberdeen C. S. Practising School, and Jane McDermott, not attached to any school; 2. Jeannie Cooper of Glasgow, Camlachie Public School, and Thomasine M. Park of Leith, St. Thomas's Public School; 3. Nellie Smith, of Aberdeen Free Church Normal School.

Orthography of Geographical Names.—A new edition of the Society's system of orthography of geographical names has been issued. The last edition was published in the *Proceedings* for February, 1892. The following rules have been added to those which are given there. "7. In the case of native names in countries under the dominion of other European Powers in whose maps, charts, etc., the spelling is given according to the system adopted by that Power, such orthography should be as a rule disregarded, and the names spelt according to the British system, in order that the proper pronunciation may be approximately known. Exceptions should be in cases where the spelling has become by custom fixed, and occasionally it may be desirable to give

both forms. 8. Generic geographical terms, *e.g.* those for Island, River, Mountain, etc., should be as a rule given in the native form. In the case of European countries, translation into English, where this has been the custom, should be retained, *e.g.*, Cape Ortegal, not Cabo Ortegal, River Seine, not Fleuve Seine. N.B.—On any printed map or MS. document an explanatory table, giving the English equivalents of the generic terms used, should of necessity be inserted." There have been one or two slight changes in the list of examples. Copies of the circular may be obtained by application to the Secretary.

EUROPE.

Distribution of Population in Sicily.—In commenting on an investigation into this subject by O. Marinelli, Dr. Theobald Fischer adds (*Petermanns Mitteilungen*, 1893, No. 8) some interesting remarks of his own on the causes of the existing facts of distribution in Sicily. Dividing the island into the three slopes facing respectively the three adjacent seas, Marinelli determined the population of successive zones of altitude in each. In all three the steep ascent from the coast strip to the tablelands above is marked by a scanty population, but the remarkable fact is, that while on the other two slopes the greatest density is found on the coast, on the African it occurs entirely above 1300 feet. This is attributed by Marinelli to the influence of malaria and the unsettled state of the country during the Middle Ages, when the population was driven inland. Fischer, however, thinks that still more is due to the natural characteristics of the coast. The steep cliff of tertiary strata, almost without indentations, exposed to the full force of the sirocco and liable to constant landslips, affords no natural harbours. The rainfall is small and springs scanty, and the principal streams (even when not brackish) are nearly dry in summer, affording no facilities for irrigation, while the extent of level ground for cultivation is small. Nor were suitable sites present for strongholds against the attacks of pirates from the African coast. The south of Sicily has long suffered from the want of a civilised coast confronting it, and now that progress has again set in in Tunis it is France that reaps the benefit. Population is more and more attracted to the face turned towards Italy, as it was in old times to the Grecian, and during the Arab epoch to the African, side.

Dr. Radde's Journey in the Kuban District.—We hear from this indefatigable explorer that he has lately returned to Tiflis from a four months' journey, in which, after visiting the whole eastern shore of the Black Sea northward as far as the Kuban district, he struck inland and crossed the mountains from the valley of the Little Laba to the sources of the Msimta. In this journey he was able to define the habitat of the aurochs, the fresh tracks of which he himself saw. The results of the journey are shortly to appear as a supplementary number of *Petermanns Mitteilungen*, which will be accompanied by a map showing the localities in which the aurochs is still found.

ASIA.

Mr. Theodore Bent's Expedition to Hadramaut.—In the latter part of November Mr. Theodore Bent proposes to leave for Aden in order to proceed into the interior of Hadramaut in Southern Arabia, for the purpose of exploring a country of great interest, but of which our knowledge is scanty. Mr. Bent himself will attend mainly to the general geographical features of the country as well as its

archæology. He will be accompanied by a trained native Indian surveyor, selected for him by Colonel Holdich, of the Indian Survey. It is also hoped that a zoological and a botanical collector will be attached to the expedition, so that the results are likely to be very complete. As on previous expeditions Mrs. Bent will accompany her husband, and among other things will attend to the photography.

Mr. Littledale's Journey in Central Asia.—This traveller writes from Kurla in Chinese Turkistan, under date May 6th, describing his progress up to that time and his plans for an advance across the little-known region which lay before him in the direction of China. He had secured the services of a Ladakhi, who had been with Lord Dunmore, and who spoke Turki, Tibetan, and Hindustani, besides having a man who spoke Chinese and Turki, so that language difficulties had been well overcome. A good supply of transport animals had been collected, and an early start was to be made southward for the Altyn Tagh near Lob Nor, which range Mr. Littledale proposed to cross if possible, and follow its southern side towards Lan-chau-fu. Scarcity of water was the chief trouble to be feared, and failing guides for the Altyn Tagh, he would be compelled to keep to the north of the range, cross the Richtu Mountains (Nan Shan), and follow the Buhain-gol to Koko Nor. Much help had been received from M. Petrovski, Russian Consul at Kashgar, and the Chinese authorities had so far shown themselves exceedingly civil. Mrs. Littledale again accompanies her husband, as on his former journey to the Pamirs.

An Ascent of Ararat.—Mr. H. F. B. Lynch has telegraphed to the Secretary of the Society that he has succeeded in ascending to the summit of Ararat. He and his party (his cousin, Captain Lynch, and the Swiss guide Taugwalder) are travelling in Armenia. The telegram is sent from Erivan, and states that on September 18th they encamped under the summit at the snow-line, and ascended on the 19th, reaching the summit after seven and a half hours' climb. Some successful mountain photographs were taken.

Chitral.—The following extract from a letter of Captain Younghusband, now in charge of the Political Mission in Chitral, where he has been for six months, gives an authentic picture of the last country which has been brought within the limits of the *Pax Britannica*. "It is a delightful country to be stationed in if it were only not so much cut off from civilisation. The people are a hardy, cheery lot of mountaineers who delight in polo, sport, and shows of any kind. The climate is delightful, and the mountains, though not wooded like those of Kashmir, have patches of forest on many of their slopes, and the villages in the valley bottoms are crowded with fruit trees. Chitral has many good points, and it is pleasant to have an opportunity of living in so interesting a country."

Recent Exploration in Tibet.—Mr. E. Delmar Morgan read a paper on this subject at the Nottingham Meeting of the British Association. The author said that while the general features of Tibet have been known from very early times, it has been reserved for recent explorers to acquaint us more closely with the leading characteristics of this marvellous region. Especially is this the case with the northern and central parts of the country, left blank on our maps. The list of these explorations begins with the Brothers Schlagintweit and continues to Captain Bower and Mr. Rockhill's recent journeys. Their discoveries have opened out new fields of research in hitherto inaccessible parts. They have ascertained the continuity of the Kuen Luen system through 20° of longitude, and made known the direction and structure of its principal chains. They have shown the lacustrine character of the central plateaus, and traced almost to their sources some of the

mightiest rivers of Asia. They have thrown light on the climatic conditions of these lofty deserts, and seen an extraordinary abundance of animal life on them. Their researches have proved the existence in former times of a line of flourishing oases along the northern foot of the Kuen Luen, by which the Chinese silk trade passed in the Middle Ages, and have brought to light the rich gold-fields of Northern Tibet. The leading features of this *terra incognita* are well described in Captain Bower's diary, and the whole subject of Tibetan exploration has been treated in the most thorough and admirable manner by M. Dutreuil de Rhins in his *Asie Centrale* and Dr. Wegener.

Formosa.—Mr. Arthur Grant Duff, in a private letter describes a recent visit he paid to Formosa. Sailing from Chefoo, which he describes as the great seaside resort of Northern China, he landed at Kelung, the beautiful port of the north-east of Formosa. The richness of the vegetation to the water's edge is remarkable, the hills from a distance having the appearance of being covered with gigantic moss. He was much impressed by the beauty and fertility of the island, and the wild grandeur of the mountain districts. Formosa is one of the few Chinese provinces with a railway. This line runs from Kelung to a point about 20 miles beyond Tai-pei, and it is proposed to extend it to Tai-nan, about 200 miles to the south. The capital consists of three towns close together—Tai-pei, the official residence, Twatulia, where the Europeans live, and Banka. Mr. Grant Duff also visited Tao-tzu-zuan, the railway to which runs through a fine plain bounded by imposing ranges of hills.

Types of Vegetation in Sakhalin.—M. A. Krasnov, Professor of Geography at the University of Kharkov, last year made a journey in Eastern Asia to study the distribution of plants and other questions connected with the evolution of floras. Some of the results, especially for the island of Sakhalin, appear in the *Annales de Géographie* for July last. Owing to the cold currents to which the island is exposed, its climate is such as usually belongs to much higher latitudes; its flora resembles that of Spitzbergen, and the conditions of plant life must resemble those which prevailed in the glacial epoch in Europe. The most remarkable fact is the existence side by side of distinct types of vegetation, due to variations, not of climate, but of soil and relief. This should be a warning against hasty conclusions as to the succession in past time of distinct types of vegetation in Europe, it being possible that they also existed side by side. The principal types in Sakhalin are:—(1) On the mountain summits, a Polar flora (*Empetrum*, etc.). (2) On the slopes down to sea-level, the *Taiga* or forest of conifers (*Abies* and *Picea*), with birch, maple, and mountain ash, presenting an appearance very like that of European pine-forests. (3) On the level and swampy lands a forest of larch, associated with *sphagnum* and other peat-bog plants. Owing to accumulation of snow the trees often die, and their trunks are found buried in the bogs. The supervening type of vegetation is (4) that of the Siberian Tundras. (5) On the river banks in the plains occur deciduous forests with Manchurian species of *Juglans*, *Quercus*, *Ulmus*, etc. In the south, these alternate with prairies of tall grass of quite a tropical aspect. Of the inhabitants, the nomadic Tunguses people the Tundra, the Orochones hunt in the *Taiga*; on the coasts live the Ainu fishermen, while the Russian exiles reap precarious crops of cereals during their forced sojourn in this inhospitable country. M. Krasnov also visited Kyushu and Java, in the latter of which islands the similarity of the flora on the tops of the volcanoes with that of the Polar swamps, suggested problems as to the evolution of the Polar forms from tropical prototypes.

Trade of Jidda and Hodeida.—From a recently-issued "Report on the Trade of Jeddah" (Foreign Office, 1893, Annual Series, No. 1264) it appears that the mother-of-pearl industry, which at one time was of considerable importance, has of late years very much decreased. The best mother-of-pearl shells in the Red Sea are found farther south, so Massawa being the nearest and most convenient market for them, very little is now produced on the Arabian side of the Red Sea. The export trade is therefore very limited, being confined to mother-of-pearl, gum, skins and hides, and a few minor articles, of which henna is the principal. The imports to Jidda from British India include rice, cotton, and silk goods, cereals, sugar, coffee and tea. Hodeida at present is the most flourishing seaport town in Yemen. Since the fall of Mocha it has acquired most of the coffee trade of that place. It is a large, fortified town, with a population of fifty thousand, situated in lat. 14° 49′ N., long. 42° 51′ E. The principal articles of import are grain, viz., all kinds of cereals, and rice, chiefly from India, and some from Europe; cotton manufactured goods and petroleum from America; sugar and paper from France; and hardware, timber and paper from Austria. As regards exports, cotton and indigo, which grow in the country, are used for the manufacture of a kind of cloth for export to other parts of Arabia. Pearls, senna and myrrh mostly go to India; rock-salt in large quantities is shipped from Salif to India.

Exploration in the Mustagh Mountains—Erratum.—In Mr. Conway's paper in the October number, p. 292, 14 lines from the top of the page, *read* "7" *instead of* "5" miles an hour. In the discussion, p. 301, lines 13 and 16 from the bottom, in some copies of the *Journal*, *Kanchanjanga* is given in mistake for *Kishangang*.

AFRICA.

Dr. Gregory's Expedition to Mount Kenia.—Dr. J. W. Gregory of the Natural History Museum, returned a few days ago from his expedition to Mount Kenia and the neighbouring region. It will be remembered that Dr. Gregory accompanied Lieutenant C. W. Villiers' expedition, which left England for the Jub River in October last year. By the departure of Lieutenant Villiers to join Sir Gerald Portal, the expedition was broken up. Dr. Gregory, however, determined not to return without doing some good work. He therefore, as he stated in the letter published in last month's *Journal*, went to Mombasa, and with forty men proceeded to Mount Kenia. This mountain he ascended to a height of at least 17,000 feet, and found it almost completely glaciated from that height to the summit (about 20,000 feet). Dr. Gregory is a geologist, and the observations which he has been able to make will be found of great scientific importance. He has made large collections not only in geology, but in zoology and botany. He also examined the country around Mount Kenia, and it is expected will be able to throw much new light on the hydrography and the geography generally of this interesting region. Dr. Gregory will probably give an account of his expedition at one of the Society's meetings in January.

Sierra Leone.—The Colonial Report (Miscellaneous No. 3, 1893) on Sierra Leone contains the Reports of Mr. Scott Elliot on the botany and of Miss C. A. Raisin on the geology of the district from specimens collected by the Anglo-French Boundary Commission. The country is everywhere underlaid by a gneissose rock, which crops out on the sea-coast, on the tops of the higher plateaux, and forms the broad watershed which separates the Skarcies, Rokelle and Niger drainage areas. This rock, however, is not much seen on the surface of the lower districts, where

the country is covered with reddish laterite. In the north-west corner of the British sphere of influence at Wallia and Baiabaia there is a well marked dolerite flow, in the neighbourhood of which there are some hardened slates or argillites. A detailed report of about one hundred specimens of rock is given in an appendix by Miss Raisin. The soil of Sierra Leone belongs to one or other of three classes—that of the hills and high plateaux formed by the disintegration of gneiss or granite; the red laterite which covers all the lower hills down to sea-level; and the alluvium formed mostly by mangroves on the coast and by rivers inland. The whole of the country from Mabile to Rokon, and round from Digipali to Kishom, was once a wide arm of the sea. This has been turned into a rich, vegetable alluvial mud, perhaps better suited for rice-growing than any other soil in existence, by the gradual advance of the mangroves seawards. There are wide alluvial valleys about Musaia and Falaba, at Farana, and on the Upper Skarcies there must be some 500 square miles of alluvium. The greater portion of the country consists of low, rolling hills, once covered by virgin forests. These have been cut down by natives for cassada clearings, and abandoned after four years' cultivation. These abandoned clearings now form a thick impenetrable bush. In the north-west there are plateaux, about 3600 feet in height, and here cattle seem to find better grazings than in any other part of the country. The Skarcies River is a broad stream navigable up to Kamblia, whence, up to Konlia, rapids and rocks make it impassable. If good canoes existed on the upper tributaries to take down the produce from the Tamisso country it would greatly cheapen the cost of carriage. The Rokelle is navigable for a considerable distance inland. The climate (excluding the mangrove districts) is not worse than that of India; but it appears improbable that European settlers can ever colonise the country without great loss of life. There are two main highways into the interior. The first is from Port Lokko through Bentembu, Kahreni—whence the road is extremely bad—and Kabusa to Falaba. The other road passes from Port Lokko diagonally to the Talla country and the junction of the Kora and Skarcies Rivers. The best route would probably be up the Rokelle, whence a road could be made to Koronko, which would avoid the difficult country above Kahreni. In the northern parts of the country the population has been almost destroyed by constant fighting, and most of the young men take to slave-trading. Mr. Elliot appends a list of varieties of timber, and a report of the different botanical articles of export. Coffee is indigenous, and is being grown with success. The kola nut grows everywhere, and its good qualities are rapidly acquiring a wide reputation. Pepper, vanilla, ginger, and many other spices, would repay cultivation. The oil palm is one of the most important economic plants, but ground-nuts and sesame are also largely produced. There are several valuable native fibre-plants, and many gum and dye-producing trees.

Italian Exploration in the Somali and Galla Countries.—The activity of Italian explorers in these countries continues unabated. In a recent number of *Petermanns Mitteilungen* (1893, No. 8) there are some details respecting recent expeditions. The most important is that of Captain Bottego, who, starting from Berbera in September 1892 accompanied by Captain Grixoni, and taking the route followed by James, Robecchi and others to the Upper Webi Shebeli, continued his journey till he struck the course of the Gaunale-Diggo (Lesser Gannale or Ganana). This stream, having been followed for twenty-eight days towards its source, proved to be a northern tributary of the Jub, the main stream, or Greater Gannale, flowing a ten days' march further south. This was also reached, after which the explorers separated, Grixoni making his way direct to Bardera and the coast, while Bottego purposed continuing his route westwards to define the relations

of the Upper Jub with Lake Rudolf and Kaffa, hoping afterwards to follow the river to its mouth. Grixoni, on his way to Bardera, first traversed an uninhabited and waterless tract for seven days, then followed a tributary of the Jub on the right bank for eight days more, after which he struck across to an important centre of Somali population, called Luk, or Logh. He thus effected a crossing of the Eastern Horn of Africa further west than Robecchi. Another expedition is that of Prince E. Ruspoli, who reached the Upper Jub by a route a little to the south of Bottego's.

AMERICA.

Climatology of the Cotton-Plant.—Dr. P. H. Mell contributes a report (*Bulletin* No. 8) on the climatology of the cotton-plant to the U.S. Weather Bureau. He deals with the three chief varieties, the *Gossypium bahama*, native to Egypt, the *Gossypium barbadense* from Persia, and the *Gossypium herbaceum*, a name applied to all cotton grown in the interior of the cotton belt. At the opening of the American civil war in 1861, the cotton region included South Carolina, Georgia, and Florida, Alabama, Mississippi, Louisiana, part of Tennessee, Arkansas and Texas, between the Gulf of Mexico and 34° N. lat. Up to 1860, this belt was gradually extending east, west, and north. On the east it reached the coast of North Carolina, on the west as far as the Rio del Norte in Texas. The counties around Memphis were the most productive. A line running a little north of the 36th parallel marked the northern limit of the cotton belt, which was bounded on the south by the 29th parallel. But owing to increased demands after the war, attempts were made to force the cultivation of cotton to the north of this limit. All such attempts to extend the cotton-growing area much beyond Tennessee have failed, and at present the limits remain nearly what they were in 1860. The regions of high percentage are confined mostly to the central parts of Mississippi, Alabama and Georgia, where the area under cotton averages above 65 acres per square mile. Regions of maximum growth of cotton form two belts, one lying along the Mississippi within the alluvial region, while the other lies in the black prairie district stretching from north-eastern Mississippi south-eastward through the centre of Alabama. In Tennessee it is to be noticed that the counties which produce most cotton are the most southerly ones, and the production decreases almost uniformly towards the north. This is specially so in West Tennessee, and in explanation it is to be noted that the isotherms for spring and autumn extend north-west through the state parallel with a line running through Chattanooga and Trenton. The cretaceous formations, as in the "Black Belt" of Alabama, have been found most adapted to the growth of the cotton-plant. Dr. Mell proceeds to contrast the climate of the southern States with that of other cotton-growing countries, the West Indies, India, Mexico, Australia, Brazil, the Argentine and Egypt, and concludes that only in the southern States are found such uniform distribution of rain, and such gradual changes of temperature as are essential to the perfect growth of cotton. In the cotton belt the mean temperature of the three summer months is remarkably uniform; in June, the mean ranged between 81° and 76°, in July between 83° and 78°·5, and in August, between 81°·5 and 78°·5. The mean daily maxima and minima are never great extremes. During the twelve years under discussion, the mean maximum varied only 4° in June, 4° in July, and 3° in August. The mean minimum for June varied only 3°·5, for July 3°, and for August 3°. During the winter months the variation was much greater. An attempt has been made to secure data for a comparison of the soil temperatures in different districts of the cotton belt, but as yet observations have only been made at Auburn and Uniontown, and that only during a period of two months.

POLAR REGIONS.

Arctic Exploring Expeditions.—News comes through Mr. F. G. Jackson, who is travelling in the Yalmal Peninsula, from Yugor Straits dated August 30th, that Dr. Nansen had finally left the Straits only ten days previously. Further intelligence states that the new Russian vessels from Dumbarton proceeded into the Kara Sea by way of Yugor Straits, and arrived at Golchikha (probably Golchinsky) on September 3rd, discharging cargoes of rails. Captain Wiggins, in charge of another vessel with railway material for the trans-Siberian railway, has also made a successful voyage to the Yenisei. The *Fram* has in all likelihood passed the Yenisei, if she has not reached the Olenek, where Dr. Nansen expected to be by this time. Lieut. Peary's Greenland expedition reached Bowdoin Bay, 78° 35′ N. on August 3rd. They left St. Johns on July 4th. Heavy weather lost them some mules and their most valued dog. After calling at Hopedale, Holsteinborg was reached on July 26th, two days later Godhavn, and Upernavik and Tasaisak soon after. Verhoef, the ill-fated geologist of the first expedition, must, they finally concluded, have perished in the attempt to cross the glacier now bearing his name. The *Falcon* weighed anchor on August 20th on her return. Walruses were killed for their eighty-nine dogs; and eider ducks and reindeer secured. The house was built, and Astrup commenced taking provisions and gear up on to the inland ice. Lieut. Peary and a party are hunting reindeer, and expect to secure seventy or more; while Astrup with two men and fifty dogs are conveying provisions to certain depôts, possibly sledging half way to Independence Bay. All is well and their hopes sanguine. An American steam whaler, the *Newport*, which wintered at Herschel Island just west of the Mackenzie River, is reported, in that longitude, to have reached 84° N.; but confirmation is necessary, and the ship's log and instruments must be examined before the statement is received with confidence. If the position is verified, the *Newport* succeeded in reaching 50 miles farther north than any previous explorers have attained, so far as authentic information goes.

Mr. Jackson's Expedition to the Yalmal Peninsula.—A letter has recently been received from Mr. Frederick G. Jackson, dated August 28th, and written at the entrance to the Yugor Straits, in which he mentions that he is proceeding to the Yalmal Peninsula by land from Khabarova. As he is alone, he is taking two or three Samoyedes to help with his sledges. Whether he will be able, after all, to include the southern island of Novaya Zemlya in his journey this winter will depend upon the success which attends his exploration of Yalmal; but as he hopes to return to England in the early spring, it is more than doubtful. From some remarks in his letter it would seem that the ice is not so favourable in the Kara Sea as had been expected, but of the conditions eastwards news may be received later on from Nansen. Mr. Jackson has four sledges with him—two of Norwegian make (10 feet 6 inches by 18 inches, and 9 feet 6 inches by 18 inches; weight equal to 17 pounds); one of English make (9 feet by 22 inches; weight equal to 24 pounds); and a Canadian toboggan, shod with steel. He is using both Canadian snow-shoes and *ski*. He will eventually sledge back to Archangel, and hopes to be there by the end of February. We may anticipate some interesting records of temperature as well as some new information about the Samoyedes.

Lieutenant Garde's Greenland Expedition.—Last summer another expedition was at work on the inland ice and the coast of Greenland, despatched by the Commission for the Guidance of the Geological and Geographical Researches in

Greenland of Copenhagen. It was conducted by the Danish lieutenant, Th. V. Garde, who was one of the members of the celebrated Eskimo boat expedition along the east coast in 1883–85 under Lieutenant Hahn. Lieutenant Garde was accompanied by Lieutenant Count Carl Moltke and Herr Johan Petersen, of the Royal Greenland Trading Society. The expedition left Copenhagen in April in the steam trader the *Hvidbjörn*, and arrived at Frederikshaab in May, whence it proceeded to Julianehaab, in order to make a geographical survey of the coast. Writing from a small trading station, Kagsimuit, on July 1st in lat. 60° 47′ N. and long. 48° 10′ W., Lieutenant Garde states that he had with his companions just returned from a trip on the inland ice, which had lasted from June 16th to the 28th, having covered in all some 250 miles (English), and reached halfway inland in the latitude of Frederikshaab. The party started from Sermitsialik Glacier, falling into the sea in lat. 60° N. and long. 47° N. They marched first for about 100 miles in a direction north-east by ¼ east, then 10 miles east, where the ridge of the country was attained in an altitude of about 7000 feet. Thence they tramped to the south-east towards a "Nunatak," or mountain peak in the ice, a little more than 7000 feet in height, situated to the north of Julianehaab, and called Aputajuitsok. Hence the party marched back along the Ikersuak Fjord on its northern shores to their starting-point. The party only walked at night when the snow was hard with the frost, as the sun made it soft, nearly the entire journey being performed on foot in boots, snowshoes being only used occasionally. Provisions, etc., were carried on two sledges. Close to the seashore the ice was difficult to traverse owing to fissures; but all went well. Further, Garde reports that during the boat journey southwards from Frederikshaab they sailed *outside* Nunarsuit, in spite of some ice. The latter is an island of considerable size in lat. 60½° N., and long. 48° W. No former expedition has sailed outside this island on account of the heavy drift-ice there, and it has not been previously surveyed geographically. There was, however, much heavy ice in this locality at the time, but the weather was fine. The expedition was to return by the last vessel from Greenland this autumn, when it is expected that this exploration of the inland ice will throw some fresh light on this interesting subject.

Dr. Drygalski's Greenland Expedition.—Owing to an unusually mild season, the expedition sent by the Berlin Geographical Society, under Dr. Drygalski, which wintered on the Karajak Fiord, was able to make good progress with scientific observations, by means of short excursions, including one to the great Jakobshavn glacier, which has changed considerably since Steenstrup's visit.

The Currents of the Arctic Seas.—In the *Kölnische Zeitung*, with reference to Dr. Nansen's Polar expedition, Dr. Köppen, editor of the well-known *Annalen der Hydrographie*, advances a proposal for the study of the Arctic currents by throwing into the sea or placing on ice-floes objects which on their re-discovery would indicate their drift, particularly where the direction is towards the Pole, *i.e.*, between Novaya Zemlya and Bering Strait. If, remarks Dr. Köppen, certain articles of the *Jeannette* expedition drifted on floes right away from the New Siberian Islands to the south of Greenland, other objects should also find their way thither, *i.e.*, getting into the East Greenland current and come ashore at Cape Farewell or in Massachusetts, or at all events fall into human hands somehow. As is well known Nansen's expedition is based on the theory of such a current. Dr. Köppen advocates for his scheme either the use of the strong glass bottles invented by the Prince of Monaco, and employed by him in the Atlantic Ocean, enclosing slips of paper, and encased in copper with a layer of tar between, or simply pieces of hard wood, bearing

inscriptions in metal studs. He particularly recommends his scheme to the attention of the American whalers which every year hunt in the regions north of Bering Strait.

Norwegian Antarctic Whaling Expedition.—The Norwegians continue to prosecute the Antarctic whale or seal-fishery. The steam-whaler *Antarctic* (formerly *Cap Nor*) sailed from Tönsberg for the Antarctic in the middle of September, and passed Dover on the 27th. She is barque-rigged, carries royals, and to ensure greater speed has an unusual spread of canvas. The vessel is 226 tons register, and carries eight whale-boats, and, like Svend Föyn's other ships, is painted green with a yellow stripe. She is altogether a good model and a swift sailer, drawing on her departure 17 feet (Norwegian). She was sent out by Commander Svend Föyn, and is in charge of Mr. H. J. Bull, her sailing-master being Captain Leonard Christensen; the crew numbers twenty-six all told, and the craft is considered the best equipped whaler that ever left Norway. There will not be time to call at Sydney, as was originally intended, but the ship will steer for the Crozet Islands, and thence, should she reach there about the beginning of January, will proceed south by Kerguelen to the ice, and passing Sabrina and Adelie Land, a search will be made for open water between 75° S. and 78° S. in Ross's position near South Victoria Land, with the hope of finding good whaling grounds. Should circumstances compel the *Antarctic* to call at Sydney, the expedition will search for whales about Macquarie, Emerald, Campbell, and Auckland Isles during the winter, and penetrate further south the next summer. Considerable interest is attached to this expedition, since regions will be traversed which have only been visited by Ross. Although there is no special scientific staff on board, meteorological and other observations will be made, Mr. Bull having received instructions from the Norwegian Meteorological Institute and Christiania University.

OBITUARY.

Admiral Jansen.—By the death of Rear-Admiral Marin H. Jansen, of the Royal Netherlands Navy, the Society has lost one of the most active and accomplished of its honorary corresponding members, and one who took a sympathetic and zealous interest in our welfare. Born at Antwerp on September 10th, 1817, he was bent on becoming a sailor from his earliest years. When the Belgian rebellion broke out, being only twelve years of age, nothing could restrain his youthful ardour. He found his way to one of the forts held for the Dutch by the Duke of Saxe Weimar, and thence on board the corvette *Proserpine* in the Scheldt, commanded by his uncle Captain Van Maren. The patriotic little lad remained on board until November 1831, taking part in the conquest of the left bank of the Scheldt from Fort Marie westward.

Jansen's parents removed to Delft in Holland, and the young volunteer was sent to the Naval Institute. After four years he was appointed midshipman of the first-class, on board the frigate *Bellona*, cruising in the North Sea; and in 1836 he sailed for the Netherlands Indies, where he was placed under the orders of Captain Koopman at Soerabaia.

In 1837 he entered the marine surveying service, being appointed to the schooner *Crocodile*, and for three years he was occupied in surveying the Riouw Archipelago in the Straits of Sunda. He returned to Holland in 1841, on board the frigate *Maas*, commanded by his uncle Captain Van Maren, and soon afterwards was entrusted

with the command of a gun-boat in the Scheldt. But he was not long in Europe, for in October 1842 he was again sent out to the East Indies on board the frigate *Palembang*. By that time he had established a position for himself as an able surveyor. He was entrusted with the survey of the navigable water of the Wester, near Soerabaia, and afterwards became a member of the commission for improving the navigation. In 1844 Jansen mapped the east coast of Bintong, and in July 1845 he fixed his head-quarters at Padang, thence correcting the survey of the Sumatra coast.

Jansen was recalled to Batavia for more active service in 1847, and was promoted for the extraordinary rapidity with which he helped to organise an expedition to Bali. For his admirable surveying service he was created a Chevalier of the Order of the Golden Lion, and received a gold watch and chain from the merchants of Java. Returning to Holland in shattered health, he was soon afterwards associated with Captain Bruining in a commission for the defence of the southern frontier, and this led to an appointment in the Colonial Office at the Hague, in 1849. At this time Jansen published two naval pamphlets, and various useful measures connected with the colonies were due to his initiative. In April 1851 he resumed active service in the navy, as a lieutenant on board the frigate *Prins van Oranje*, under the command of Captain Bijl De Vroe. Jansen served in this vessel in the Mediterranean, West Indies, and on the coast of Central America. He also visited Washington at a time when Maury was at the height of his fame, forming a life-long friendship with the illustrious American hydrographer.

In June 1852 Jansen was once more in Holland, actively engaged on geographical and other work, always with a view to furthering the interests of his country. He brought the model of a clipper from New York, after which the *Kosmopoleit*, owned by the brothers Blussé, and other vessels, were built. In 1853 he was the representative for the Netherlands at the Congress held at Brussels for establishing an international system of observations, and in the following year he was appointed naval assistant to Buys Ballot, in the meteorological observatory at Utrecht.

In 1855 Maury had published the first edition of his fascinating book, 'The Physical Geography of the Sea'; and in the same year Jansen brought out a Dutch translation with valuable appendices on land and sea breezes in the tropics, and on ozone, which Maury wisely incorporated in subsequent editions, at the same time offering a well-deserved tribute of appreciative praise to his accomplished coadjutor. "Jansen," he wrote, "has helped me to enrich my work with his fine thoughts. The reader will, I am sure, feel as I do, deeply indebted to him for so much instructive matter set forth in his very delightful and pleasant manner. Among those whose debtor I am, stands first and foremost the clear head and warm heart of this Dutch officer, whom I am proud to call my friend. He is an ornament to his profession, and a more accomplished officer it has never been my good fortune to meet in any service. Jansen has served many years in the East Indies. He observed minutely and well. He has enriched my humble contributions to the 'Physical Geography of the Sea' from the store-house of his knowledge, set off and presented in many fine pictures. He has added chapters on land and sea breezes, on the changing of the monsoons, on the south-east trades of the South Atlantic, and on winds and currents generally."

Towards the end of 1855 Jansen was sent to England to sail in the trial trip of the *Royal Charter* to Australia. He went from Melbourne, Torres Strait, to Batavia, returning to Europe in 1857. After a short service in the Dutch Ministry of Marine, he received command of the steamer *Djambi* to form part of the Dutch squadron in the West Indies from 1861 to 1862. After this tropical service Jansen visited England, France, and Germany to make himself acquainted with the latest

phases in naval construction and ornament, and in 1864 he published an important work entitled 'The Latest Discoveries in Maritime Affairs.' In the following year he was appointed Commodore of the last Dutch sailing squadron; and soon afterwards was entrusted with the responsible duty of superintending the building of the iron-clad *Prins Hendrik* by Messrs Laird at Birkenhead.

In 1867 Captain Jansen took command of the *Prins Hendrik*, and went on an experimental cruise in the North Sea and English Channel, trying her qualities in all weathers. He put her out of commission at Nieuwediep in 1868, and retired from active service after a distinguished naval career of thirty-five years. On this occasion he was decorated with the Commandery of the Oaken Crown.

Commodore Jansen had become an Honorary Corresponding Member of our Society in 1865, and always took a deep interest in our proceedings and in our welfare. We have never had a correspondent who was so ready and anxious to assist us by every means in his power. When the question of an Arctic expedition was under discussion, Jansen gave up much time to an examination of the Dutch Archives, with a view to a study of the ice in the Spitzbergen Seas, as reported by the Dutch whalers during the last three centuries. The results of these investigations were embodied in a most valuable and original paper which was published in our *Proceedings* (Old Series, IX., p. 163). Jansen also examined the archives at Middelburg, assisted by Professor Veth, for information respecting discoveries in Tibet, and collected all that is known of the remarkable journey of Samuel Van de Putte from India, through Lhasa, to China. In 1869 Jansen published an important pamphlet, which excited much attention at the time, entitled 'A Bridge over the Ocean,' advocating the establishment of lines of large steamers to America. In 1873 he was appointed to represent the Netherlands at Constantinople, in the commission for establishing uniformity in ship measurements, when he received from the Sultan the Order of the Osmanië. In the following year Jansen was appointed to the honourable and dignified post of a Councillor of State, which he continued to fill until his death. He also attained the rank of Rear-Admiral.

Jansen was the chief promoter of a revival of Arctic exploration in Holland, being ably, and, indeed, enthusiastically, seconded by his young friend, Lieutenant Koolemans Beynen. The veteran sailor always felt the warmest sympathy for the aspirations of his youthful brother officers; and his encouragement of the patriotic ardour of young Beynen led to the formation of an Arctic Committee at the Hague, and to an appeal to the public for funds. On April 6th, 1878, the schooner *Willem Barents* was launched, and sailed for the Arctic Seas, under the command of Lieutenant A. de Bruyne, with Beynen as his second. Admiral Jansen drew up the instructions. He considered that the Barents Sea, between Spitzbergen and Novaya Zemlya, would make an excellent training-ground for Dutch seamen, but that the first voyage should be confined within the limits of what is easily attainable. He thought that, by yearly increasing knowledge and experience, his countrymen might in time be in a position to undertake more hazardous and difficult voyages. The *Willem Barents* went direct to Amsterdam Island, near the north-west point of Spitzbergen, and then dredged and took deep-sea soundings in the Barents Sea. The first voyage was, in Beynen's words, "a scientific examination of the sea that bears the name of the greatest of our mariners."

On the little schooner's return, the young officer who had been the mainstay of the expedition was ordered to the East Indies. Beynen died of fever at Macassar, and his loss was deeply felt, not only in Holland, but also by many warm friends in our Society; but none mourned for this brave young fellow more deeply than Admiral Jansen, who looked upon him almost as a son. He loved the young lieutenant for his ardent patriotism, for his Arctic enthusiasm, and for his devotion

to duty. The aspirations of his own youth seemed to be revived in the career of Beynen. His grief for Beynen's untimely death was deep and abiding.

Jansen continued to send out the *Willem Barents* on those summer cruises which have proved so valuable to science. In her second voyage Franz Josef Land was sighted, and a large natural history collection was brought home. In 1880, on her third voyage, the little schooner got on shore on the coast of Novaya Zemlya and was nearly lost, so that little was done; but in 1881, with Captain Broekhuysen in command, much valuable work was achieved. During her fifth voyage, in 1882, the *Willem Barents* was the first vessel to find and welcome Mr. Leigh Smith's boats retreating from Franz Josef Land. The sixth and seventh voyages, under Lieutenant Dalen, also brought back valuable collections and hydrographic information; and thus the useful and patriotic enterprise initiated by Jansen, and his young friend Beynen, was steadily persevered in during a course of years.

In his declining days Jansen suffered from rheumatism and defect of vision, but he was surrounded by numerous devoted friends of a younger generation. He was a tall man with very erect carriage, a high intellectual forehead, and a very benevolent expression of countenance, full of sympathy for the interests and anxieties of his friends, and a most delightful companion. He was an admirable *raconteur*, though always more ready to show interest in what occupied the minds of his companions, than to talk of his own experiences. The events of his long and most useful life sufficiently set forth his higher qualities. The great mass of information on many subjects with which his mind was stored, was lightened by the play of a bright and vivid imagination. A most able and accomplished seaman and a sound geographer, he was also a wise and prudent statesman.

During the last year Jansen was seldom able to go out. He passed most of his time in his chair, writing and reading. During last September his strength declined rapidly, and he died at the Hague on the 9th. On the next day he would have completed his 77th year. His mind was clear to the last, and he suffered without a murmur, or a word of complaint. He was always cheerful, when friends came to see him, and took the deepest interest in their welfare to the very last.

In Admiral Jansen our Society has lost one of the truest and most active of our foreign friends, and the sorrow for his death will not be confined to his own country. Among many others, the present writer deeply feels the severance of a warm friendship extending over more than a quarter of a century. C. R. M.

Emin Pasha (Dr. E. Schnitzer).—Of Emin Pasha's fate there can now be no further doubt.

Edward Schnitzer was born on March 28th, 1840, at Neisse, the son of a merchant. He studied medicine at the universities of Breslau, Berlin and Königsberg, and having graduated in 1864, his strong desire to travel and love of natural history led him to the East. Ismail Hakki Pasha, at that time Governor of Scutari, appointed him harbour-surgeon at Antivari, and subsequently he accompanied his patron on various official journeys and military expeditions, which made him acquainted with Armenia, Syria and Arabia. Ismail died in 1873. Early in his Oriental career, Dr. Schnitzer assumed the name of Emin, "the faithful one," because he believed that this would enable him to obtain a better insight into the Islam world, than would have been possible to a Frank. But he wrote to his sister in 1871, "I have only adopted the *name*, I have not become a Turk."

After a short visit to his native town in 1875, Dr. Schnitzer sought service in Egypt, and was appointed chief medical officer in the Equatorial Province, of which Gordon Pasha was then Governor. Gordon fully appreciated the great gifts of his

medical officer, and intrusted him with various diplomatic missions. It was thus he visited Uganda, twice, in 1876 and again in 1878, and King Kabrega of Unyoro in 1877. In 1878 Gordon Pasha, who had assumed the reins as Governor-General of the Egyptian Sudan, appointed his former medical officer Governor of the Equatorial Province. This is not the place to speak of Emin's achievements in that capacity, achievements all the more deserving of recognition, as they were attained in the face of considerable difficulties. Of the value of his geographical and scientific work there can be no doubt. Every portion of the wide region entrusted to his care became known to him by personal observation, and his descriptions of the countries through which he passed and the care with which he mapped his routes may serve as patterns to all engaged in the exploration of Equatorial Africa. His collections, too, have enriched the museums of England and of his native country, and the esteem in which Emin is held by naturalists is quite as great as that entertained for him by geographers.

When the Mahdi's rebellion broke out in the Sudan all communications with the Equatorial Province ceased for a time, and schemes for the "relief" of its governor were set on foot. Of the various expeditions fitted out for that purpose only that led by Mr. H. M. Stanley attained its object; but it was with evident reluctance that Emin left behind him a country, which years of arduous labour had endeared to him, and followed his "liberator" to the east coast.

Emin's sensitive nature shrunk from a visit to Europe, and, when he had recovered from a serious accident, he gladly entered the German service, and took the lead of an expedition which was to establish stations on the Victoria Nyanza. He left the coast on April 20th, 1890, occupied Tabora, on the main-road connecting Bagamoyo with Lake Tanganyika, and then founded the station of Bukoba, on the western shore of the Victoria Nyanza. But this accomplished, his old love of travel appears to have revived. Disregarding the somewhat peremptory instructions of his superiors, he crossed over into the British sphere, visited his and Stanley's old camping-ground at Kavalli's,—where his old soldiers, since taken into the service of the British East Africa Company, received him but coldly,—and made an effort to push northward and north-westward in the direction of the Upper Welle, probably intending to make his way through the unexplored Niamniam countries to Lake Chad. An account of this expedition has been rendered by Dr. Stuhlmann,* the companion of Emin, and by Emin himself in delightful letters of travel published in *Westermann's Monatshefte*.

When Dr. Stuhlmann left Undusuma on December 10th, 1891, Emin was ill and nearly blind, and the people around him were dying of small-pox. Conflicting rumours were beginning to circulate with respect to his fate. Lieutenant Langheld, the commandant of the German station of Bukoba, appealed to Captain Lugard to send relief to Emin, who was then believed to be still at Kavalli. Captain Lugard cordially responded to this appeal, but when his messengers reached Kavalli's, they found that Emin had joined some of Kilonga Longa's Manyema, and had started with them on March 12th, 1892, for the west. The rest of Emin's melancholy story has become known to us through Lieutenant Dhanis. The Manyema, who had undertaken to conduct Emin to the Congo, travelled slowly. It was May 29th before they left a camp on the upper Ituri, in long. 29° 50′ E. Passing through Indekuru, they reached Ipoto, the headquarters of Kilonga Longa in Stanley's days, on August 1st. Eight days afterwards, on the 9th, Emin had the misfortune to lose the whole of his scientific collections in the Kunde rapids. On the 20th of the month named Emin left the Ituri, and taking a route marked on Mr. Stanley's

* See map and account in *Proceedings*, R.G.S., 1892, p. 542.

map as being used by "ivory raiders," he reached the country of the Walumbi (Urimbi), where a stock of provisions was laid in to enable him to cross the uninhabited forest which separated him from Kinena's villages near the Congo. On October 12th he reached Muomena, one of these villages, within three days' journey from Kibonge's town on the Congo (0° 52′ S., 25° 50′ E.), and there, on the 20th, he was murdered by order of Mwini Mohara, the "brother" and "commander-in-chief" of Tippu Tib. The accomplishment of this evil deed was intrusted to Said ben Abed, but the actual executioner was a Nyambara * named Ismaeli, a man actually in Emin's service. Lieutenant Dhanis has succeeded in recovering a box containing Emin's journals, and these have been forwarded to Europe.

Thus perished miserably, in the wilds of Africa, a man who had devoted many years of his life to the cause of African civilisation, whose scientific work had secured him a foremost place in the devoted band to whose labours we are indebted for our knowledge of the Dark Continent, and whose unselfishness, amiability, and strong sense of duty are extolled by all who came into contact with him. Emin has left behind him an only child, the daughter of an Abyssinian wife, to whom he was devotedly attached, and who is now with her aunt at Neisse.

Dr. Schnitzer never published a book of travel, but numerous papers from his pen have appeared in *Petermanns Mitteilungen*, the publications of the geographical societies of Leipzig and Vienna, the *Zeitschrift* of the Berlin Anthropological Society, the *Ausland*, and *Westermann's Monatshefte*. A collection of the more interesting of these papers, edited and annotated by Prof. G. Schweinfurth, Prof. Ratzel, Dr. Felkin, and Dr. Hartlaub, was published at Leipzig in 1888, and in an enlarged English version in the same year.†

In 1890 Emin was awarded the Patron's Medal of the Royal Geographical Society. E. G. R.

Surgeon-Major T. H. Parke.—One more of the band of men who accompanied Mr. Stanley in his memorable expedition for the relief of Emin Pasha has passed away. Surgeon-Major Parke died suddenly at Alt-na-craig, Ardrishaig, on September 10th whilst on a visit to the Duke of St. Albans.

Thomas Heazle Parke was born on November 27th, 1857, at Drumona. He was educated at Dublin, and joined the Army Medical Staff in 1881. In 1882 he was with the expedition for the relief of Gordon, and was present at the actions of Abu Klea, Gubat and Metameh, and was subsequently placed in charge of the Helwan cholera camp. He volunteered to join Mr. Stanley's expedition, and won golden opinions not only from his chief, but from all its members, whether European or native. Mr. Stanley extols him for his "excellence as a physician and his skill as a surgeon;" speaks of his "priceless services," and describes him as a "a combination of sweetness and simplicity." Mr. or rather Dr. Parke (for the university of Durham bestowed upon him the honorary degree of D.C.L.) was the author of several medical papers. He also wrote a book on his 'Experiences in Central Africa' (Sampson Low, 1891), and a 'Guide to Health in Africa' (same publishers, 1893). For the forthcoming new edition of 'Hints to Travellers,' Dr. Parke wrote the Medical Section.

H. M. Becher.—We regret to announce the death of Mr. H. M. Becher, who joined this Society last year. In the early part of September Mr. Becher was employed, on behalf of the Royal Geographical Society, on a Survey Exploration into the Province of Trengganu, Malay Peninsula, the main object of which was to

* The Nyambara are a tribe in Emin's old province.

† 'Emin Pasha in Central Africa' (G. Philip & Son).

explore and locate on the map the mountain called "Gunong Tahan," and it was while engaged upon this work that he met his death by drowning in the River Tahan. In the previous July Mr. Becher had made a coast voyage to the Port of Trengganu, and, having interviewed the Sultan endeavoured, but without success, to obtain his sanction to a general survey of the rivers of this province. Mr. Becher thence returned by sea to Singapore, having succeeded in making a fair flying survey of the coast of Trengganu, which will constitute a valuable addition to the Royal Asiatic Society's Map of the peninsula. Mr. Becher was a mining engineer of eighteen years' standing, and had travelled extensively in the exercise of his profession, having visited various places in the East including Borneo, Siam, China, Japan, Corea and Siberia, and many parts of the Malay Peninsula. He had also visited mining regions in Germany and Spain and in America. Mr. Becher was an A.R.S.M., Associate M.I.C.E., member of the Geological Society, and of the Royal Asiatic Society. He was in his 39th year when he met his death.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, &c., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Austria-Hungary—Dictionary of Places. **Grissinger.**

Artaria's Orts-Lexikon der österreichisch-ungarischen Monarchie (incl. Occupationsgebiet, 1885) nach der Zählung von 1890, enthaltend alle Orte mit mehr als 2000 Einwohnern, Kur- und Badeorte, etc., sowie touristisch wichtige Ortschaften mit Angabe der Meereshöhen. Bearbeitet von Dr. K. Grissinger. Vienna, Artaria & Co., 1893: size 6½ × 5, pp. vii. and 79. *Presented by the Publishers.*

A compact and useful index of place-names in the Austro-Hungarian monarchy with statistics of the last census.

Bosnia. *Jahresbericht V. Erdk. Dresden* **23** (1893): 124–160. **Schubert**

Das heutige Bosnien. Eine militärische Culturarbeit Oesterreich-Ungarns in Krieg und Frieden, von Hauptmann von Schubert.

The paper now published was written in 1890.

Channel Islands. *Tour du Monde* (1893): 161-224. **Boland.**

Les Iles de la Manche (Mœurs et Paysages), par M. Henri Boland.

An illustrated description of Jersey and Guernsey, including a sketch-map showing the distribution of French- and English-speaking people in 1850 and 1893.

Cyprus. **Konstantinidos.**

Topographia tes insou Kuprou pros chresin ton demotikon scholeion upo G. M. Konstantinidou. Ekdosis deutera. Genomene epi te basei tes teleutaias apographe. Larnaka. Ek tou Tupographeiou e Philokalia, 1893. Size 9 × 6, pp. 22. *Presented by the Author.*

England—Cornwall. **Murray.**

A Handbook for Travellers in Cornwall. Eleventh edition, revised. *With maps.* London, John Murray, 1893: size 7 × 4½, pp. [51] and 181. *Price* 6*s*. *Presented by the Publisher.*

The present edition is illustrated with a complete set of new maps on a large scale, and its utility is enhanced by thorough revision.

France—Bramabian. *B.S.G. Paris* **14** (1893): 98–120. **Martel.**

La Rivière souterraine de Bramabian (Gard), par E. A. Martel.

Germany—Pomerania. *Globus* **64** (1893): 237–241. **Deecke.**

Ueber Dünen und Diluvialsande auf den pommerschen Inseln. Von Prof. W. Deecke, Greifswald.

Italy—Rovigo. **Corti.**

Le Provincie D'Italia sotto l'aspetto Geografico e Storico, descritte da Siro Corti. No. 54. Regione Veneta. Provincia di Rovigo. Rome, Paravia e C. 1892. Size 8 × 5, pp. 48. *Map and illustrations. Price* 50*c*.

Norway—Rainfall. ——

Nedbør-høiden i Norge, beregnet efter observationer 1867 til 1891 af det meteorologiske institut.

Tables of the rainfall at one hundred stations in Norway, giving the annual and monthly averages, maxima and minima.

ASIA.

Central Asia. *Missions en Chine et au Congo* 1893 *passim.* **Deken.**

Voyage à Travers l'Asie. Par C. de Deken, Miss. Ap.

Account of the journey across Central Asia with Prince Henry of Orleans and M. Bonvalot.

Central Asia—Turkistan. **Ostroumoff.**

A Geography of the Turkistan Country, with a short Account of the Khanates of Bokhara and Khiva, and a Map of the Country. Compiled by N. V. Ostroumoff. Samarkand, 1891. Translated by Staff-Lieutenant E. Peach, I.S. Size 10 × 6½, pp. 74. *Map. From the 'Journal' of the United Service Institution of India*, 1893.

Translation of the official text-book of geography used in the government schools of Russian Turkestan.

India—Benares. *B.A.R. Belgique* **23** (1892): 306–338. **Robie.**

Benarés. Par Jean Robie, Membre de l'Academie Royale de Belgique.

Narrative of a visit to Benares.

India—Gurdáspur. ——

Gazetteer of the Gurdáspur District, 1891–92. Compiled and published under the authority of the Punjab Government, Lahore, *Civil and Military Gazette* Press. Size 9¼ × 6½, pp. vii., 197, and xxxix. *Presented by the Secretary of State for India.*

The Gurdáspur district is the north-easternmost of the six districts of the Lahore division, and lies between north latitude 31° 36′ and 32° 30′, and east longitude 74° 56′ and 75° 45′.

India—Sikkim. **Waddell.**

A List of Sikkim Birds, showing their Geographical Distribution. By L. A. Waddell, F.L.S. [*Proof*]. Size 11½ × 9, pp. 70. *Presented by the Author.*

Japan—Earthquake. **Koto.**

On the Cause of the Great Earthquake in Central Japan, 1891. By B. Koto, PH.D., Professor of Geology, Imperial University. Size 10½ × 7½, pp. 295–353. *Plates. Reprinted from the 'Journal' of the College of Science, Imperial University, Japan, vol. v., part iv.*, 1893. *Presented by the Author.*

This interesting monograph will be summarised in the *Journal*.

Japan—Fujiyama. *Deutsche Rundschau G.* **16** (1893): 1–10. **Kreitner.**

Der Fuji yama. Von Gustav v. Kreitner.

Describes, with illustrations, an ascent of Fujiyama on August 28th, 1891, two months before the great earthquake.

Java. *B.S.G. Paris* **14** (1893): 121–148. **Eekhout.**

Ouest de Java. La Race soundanaise; ses rapports avec les Hollandais et le pays qu'elle habite d'après les sources les plus recentes. Par R. A. Eekhout.

Palestine—Jerusalem. **Lees.**

Jerusalem Illustrated. By G. Robinson Lees, F.R.G.S. With a preface by the Right Rev. Bishop Blyth, of Jerusalem, and an Appendix illustrating the models of Herr Baurath von Schickritter, with descriptive letterpress. Translated by the Rev. J. E. Hanauer. Newcastle-on-Tyne, Mawson, Swan, & Morgan. London, Gay & Bird, 1893: size 9 × 6, pp. 163. *Presented by the Publishers.*

Gives a good idea of the present state of Jerusalem and its people, with illustrations of the most prominent objects of interest.

Persia—Bisutun. *Globus* **64** (1893): 169–174, 187–191, 207–212, 228–232. **Albu.**

Ein Besuch in Bizutun (Bisutun) Von Sanitätsrat Dr. J. Albu.

Account of a visit to Bisutun in 1889, with historical references and numerous illustrations of sculptures and objects of archæological interest.

Persia and Kurdistan. *B.S.G. Paris* **14** (1893): 5–28. **Morgan.**

Relation sommaire d'un voyage en Perse et dans le Kurdistan. Par J. de Morgan. Mission du Ministère de l'Instruction Publique (1889–91).

M. and Mme. de Morgan travelled for two years in Persia, entering it from Russian territory, going by Resht as far east as Asterabad, and returning *viâ* Teheran, travelling through Aserbaijan, Kurdistan, and Luristan to the Persian Gulf.

Russian Central Asia. *Rev. G. (Paris)* **34** (1893): 161–174. **Gault.**

La Vallée du Zérafchane. Par P. Gault.

Account of the valley of the Zarafshan, with a map.

Siberian Railway. *Rev. Française* **18** (1893): 241–258. ——

Le Chemin de fer transsibérien. *With sketch-map.*

AFRICA.

Abyssinia. **Münzenberger.**

Abessinien und seine Bedeutung für unsere Zeit. Aus dem Nachlasse von E. F. A. Münzenberger, herausgegeben von Joseph Spillmann, S. J. Freiburg im Breisgau, 1892: size 10 × 6½, pp. 161. *Map and illustrations.*

Dahomey. *Rev. Maritime et Coloniale* **119** (1893): 66–96. **Lambinet.**

Notice géographique, topographique et statistique sur le Dahomey. Par E. Lambinet, Colonel-Commandant supérieur à Ouidah. *With sketch-maps.*

Madagascar. *C.R.* **117** (1893): 416–419. **Grandidier.**

Les coordonnées géographiques de Tananarive et de l'Observatoire d'Ambohidempona (fondé a Madagascar, par le R. P. Colin). Note de M. Alfred Grandidier.

Mashonaland. **Bent.**

The Ruined Cities of Mashonaland: being a record of excavation and exploration in 1891. By J. Theodore Bent, with a chapter on the Orientation and Mensuration of the Temples, by R. M. W. Swan. New edition. London, Longmans, Green & Co., 1893: size 8 × 5½, pp. xviii. and 428. *Price 7s. 6d. Presented by the Publishers.*

This edition contains references to the work of Sir John Willoughby in his recent excavations at Zimbabwe, a letter from Mr. W. St. Chad Boscawen on the hawk-symbol at Zimbabwe, which he believes to point to an Arabo-Egyptian origin of the builders of the present ruins, and two new appendices, one of which summarises the progress of Mashonaland down to May 1893, and is contributed by the Secretary of the British South Africa Company.

Mashonaland. *Scottish G. Mag.* **9** (1893): 524–530. **Don.**

Notes of a Journey in South Africa. Extracts of a letter received by Professor Geikie from John Baylie Don, B.SC.

Mr. Don gives some valuable notes of the geology of South Africa from the Transvaal northward to Mashonaland, and he bears testimony to the remarkable kindness and generosity of the Portuguese officials with whom he came much in contact on the borders of Manikaland.

Mashonaland, &c. **Selous**

Travel and Adventure in South-east Africa: being the narrative of the last eleven years spent by the Author on the Zambesi and its tributaries; with an account of the colonisation of Mashunaland, and the progress of the gold industry in that country. By Frederick Courteney Selous, C.M.Z.S. London, Rowland Ward & Co., 1893: size 9½ × 6½, pp. xviii. and 504. *With numerous illustrations and map. Price 25s. Presented by the Publishers.*

This beautiful work is in every way worthy of the adventurous life and travels it describes, and, on account of its special interest, a more detailed notice of the book will be given elsewhere.

Mashonaland—Zimbabwe. **Willoughby.**

A Narrative of further excavations at Zimbabye (Mashonaland). By Major Sir John C. Willoughby, British South Africa Company. Illustrated. London, George Philip & Son, 1893: size 8 × 5½, pp. xiv. and 44. *Price 3s. 6d. Presented by the Publishers.*

This little book is noticed on another page.

Sahara. **Schirmer.**

Le Sahara. Par Henri Schirmer, Docteur ès Lettres. Paris, Hachette et Cie., 1893: size 10 × 6½, pp. vi. and 444. *Avec 56 cartes et gravures et 6 phototypies. Presented by the Author.*

A valuable summary of our present knowledge of the Sahara, which will be separately noticed.

NORTH AMERICA.

North America. **Harrisse.**

The Discovery of North America. A Critical, Documentary, and Historic Investigation, with an Essay on the Early Cartography of the New World, including Descriptions of Two Hundred and Fifty Maps or Globes existing or lost, constructed before the year 1536; to which are added a Chronology of One Hundred Voyages Westward, Projected, Attempted, or

Accomplished between 1431 and 1504; Biographical Accounts of the Three Hundred Pilots who first Crossed the Atlantic; and a Copious List of the Original Names of American Regions, Caciqueships, Mountains, Islands, Capes, Gulfs, Rivers, Towns, and Harbours. By Henry Harrisse. Paris, H. Welter; London, H. Stevens & Son, 1892: size 12 × 9½, pp xii. and 802.

This large and important work is profusely illustrated with maps, and will be referred to in a special article.

United States—Connecticut. **Steiner.**

History of Slavery in Connecticut. By Bernard C. Steiner, PH.D. Baltimore, The Johns Hopkins Press, 1893: size 10 × 6½, pp. 84. *Price 75 cents.*

Nos. ix.–x. of the eleventh series of the Johns Hopkins University Studies in Historical and Political Science.

United States—Missouri. *T. A. Science, St. Louis* **6** (1892): 57–99. **Winslow.**

The Mapping of Missouri. By Arthur Winslow, assisted by C. F. Marbut. *Maps.*

The mapping of Missouri is traced from the earliest maps of America on which the site of the state was practically a blank, with sketches of each notable step in the survey of the region down to the topographical work of the U.S. Geological Survey and of the Missouri Geological Survey, which is now preparing a map on the scale of one inch to the mile.

United States—Texas. *Ausland* **66** (1893): 555–558, 572–574. **Lerch.**

Das heutige Texas. Von Otto Lerch (Austin, Texas).

CENTRAL AND SOUTH AMERICA.

Costa Rica. *Nouvelles G.* (1893): 133–137. **Fabrega.**

Notes sur la Géographie du Costa-Rica. Pittier de Fabrega.

While paying a tribute to the excellence of M. Reclus' recently-published volume on the West Indies and Central America, the author offers some corrections in points of detail and matters of dispute from the Costa Rican standpoint.

French Guiana—Tumak-humak. *B.S.G. Paris* **14** (1893): 29–52. **Coudreau.**

Aperçu Général des Tumac Humac. Par Henri Coudreau.

POLAR REGIONS.

Greenland. *G. Tidskrift* **12** (1893–94): 87–110. **Ryberg.**

Om Erhvervs- og Befolknings-Forholdene i Grønland. Af Carl Ryberg.

Statistics of the productions of Greenland, and fluctuations in their amount for the last twenty or thirty years.

Kara Sea—Climate. **Hann.**

Ergebnisse der meteorol. Beobachtungen der niederländischen internationalen Polar-Expedition 1882–83 in der Kara-See. Von J. Hann. Size 11½ × 7½, pp. 10. *Presented by the Author.*

AUSTRALASIA AND PACIFIC ISLANDS.

Queensland. **Hardie.**

Notes on some of the more Common Diseases in Queensland in Relation to Atmospheric Conditions. 1887–1891. By David Hardie, M.D. Brisbane, J. C. Beal, 1893: size 9 × 6, pp. 132. *Chart. Presented by the Chief of the Weather Bureau, Brisbane.*

Victoria—Year-Book. **Hayter.**

Victorian Year-Book 1892. By Henry Heylyn Hayter, C.M.G. Vol. II., Melbourne; London, Trübner & Co., 1892: size 8½ × 5½, pp. 540. *Presented by the Author.*

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Atmospheric Conditions. **Abbe.**

Smithsonian Miscellaneous Collections, 843. The Mechanics of the Earth's Atmosphere. A Collection of Translations by Cleveland Abbe. Washington, 1891: size 9 × 6, pp. 324. *Presented by J. S. Dyason, Esq.*

Professor Abbe has brought together a judicious selection of valuable memoirs setting forth modern views on theoretical meteorology.

Bay of Biscay—Currents. *B.S.G. Com. Bordeaux* **16** (1893): 353–379. **Hautreux.**

Golfe de Gascogne: Courants. Par A. Hautreux. *Sketch-maps.*

Interesting observations which will be noticed in the "Monthly Record."

Geology. **Woods.**

Elementary Palæontology for Geological Students. By Henry Woods. Cambridge University Press, 1893: size 7¼ × 5, pp. viii. and 222. *Presented by the Publishers.*

Lakes and Rivers. *C. R.* **117** (1893): 451–455. **Faye.**

Sur le *Serpent d'eau* du Rhone à Genève. Par M. H. Faye.

A study of the eddies about the sluices which regulate the outflow of the Rhone from the Lake of Geneva.

Measurement of Height. *M. k.k. militär. G. I. Vienna* **12** (1892): 61–135. **Hartl.**

Vergleiche von Quecksilber-Barometern mit Siede-Thermometern. Von Heinrich Hartl.

An account of a series of elaborate comparisons of the mercurial barometer and boiling-point thermometer as instruments for measuring altitudes. Determinations of trigonometrically measured hills were repeatedly made by both methods, and the paper contains tables for the reduction of boiling-points to corresponding pressures.

Mediterranean Research. *Sitzb. A. W. Wien.* (*Abt.* 1) **101** (1892): 817–828. **Luksch.**

Veröffentlichungen der Commission fur Erforschung des östlichen Mittelmeeres. Vorläufiger Bericht über die physikalisch-oceanographischen Arbeiten im Sommer 1892 vom Meridian von Rhodus bis zur syrischen Kuste. Von J. Luksch. *With sketch-map.*

Physical Geography. **Thoulet.**

Introduction à l'Etude de la Géographie Physique. Par J. Thoulet, Professeur à la Faculté des Sciences de Nancy. Paris, Société d'Editions Scientifiques, 1893: size 9 × 6, pp. iv. and 352. *Price 7fr. 50c.*

A series of lectures on physical geography has been revised and published in this book with a very happy result. Although necessarily somewhat discursive and unsystematic when viewed as a whole, the chapters gain more than they lose, and the various departments of physical geography are summarised with much freshness and picturesqueness. The order of the thirteen chapters is as follows:—Physical Geography in General, The Birth and Infancy of the Earth, The Youth of the Earth, The Earth's Maturity and Old Age, Rocks, Internal Forces of the Earth, External Agencies' Action on the Earth, The Ocean, Ice, The Place of Organised Beings in the Life of the Earth, Man, The Dawn of History, and The Races of Mankind.

Physiography. **Gregory.**

Elementary Physiography: being a Description of the Laws and Wonders of Nature. By Richard A. Gregory. London, Joseph Hughes & Co., New edition, 1893: size 7½ × 5, pp. 412. *With numerous original illustrations. Presented by the Author.*

An excellent expansion of the Science and Art Department's syllabus into book-form, the work being guided, but not limited, by the official requirements. The illustrations are particularly well-chosen, so as to convey a true conception of the natural conditions described; many are from photographs by Wilson, of Aberdeen.

Solar Physics. *Verh. k. A. W. Amsterdam* (1892): *Pt. I.* **Brester.**

Théorie du Soleil. Par A. Brester Jz.

Theory of the Earth. *C. R.* **117** (1893): 370-373. **Rateau.**

Hypothèse des cloches sous-continentales. Note de M. Rateau.

The author seriously proposes to account for the fact that the density of the Earth's crust is greater under the ocean than under the land by the hypothesis that the continents are supported by cushions of gas given off by the heated material of the inner Earth.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

EUROPE.

Denmark. **Danish General Staff.**

Generalstabens topografiske Kaart over Danmark. Kalkograferet og graveret ved Generalstaben Kjöbenhavn, 1893. Scale 1 : 40,000, or 1·5 inches to a statute mile. Sheets :—Björnsholm, Nykjöbing (Mors), Dragstrup. *Presented by the Danish General Staff, through H.E. the Danish Minister.*

England and Wales. **Ordnance Survey.**

Publications issued since August 12th, 1893.

1-inch :—

SCOTLAND, with hills shaded, 125, 1*s.*

1-inch :—

ENGLAND AND WALES: 257, 269, hills shaded in black and brown, 1*s.* each.

6-inch—County Maps :—

Lancashire, 12, 2*s.* 6*d.*; 26, 2*s.* **Yorkshire**, 93 S.W., S.E., 158 S.E., 160 N.E., 175 S.E., 192 N.W., 283 N.E., S.W., 284 N.W., 1*s.* each.

25-inch—Parish Maps :—

ENGLAND AND WALES: **Lancashire**, XXX. 12, 16, 4*s.* each; LX. 10, 4*s.*; LXIV. 11, 4*s.*; LXV. 13, 3*s.*; LXVIII. 3, 4, 4*s.* each; 7, 5*s.*; 8, 12, 4*s.* each; 15, 5*s.*; 16, 4*s.*; LXXXI. 5, 4*s.*; LXXXVII. 3, 7, 4*s.* each; 13, 20*s.* 6*d.*; 15, 5*s.*; LXXXVIII. 2, 4*s.*; 3, 5*s.*; 8, 5*s.*; 9, 14*s.*; 10, 12, 5*s.* each; XC. 12, 15, 16, 4*s.* each; XCV. 2, 8*s.*; XCIX. 10, 5*s.*; C. 4, 7, 4*s.* each; 8, 5*s.*; 9, 10, 11, 15, 4*s.* each; CII. 9, 10, 5*s.* each; CVI. 15, 14*s.*; 10, 20*s.* 6*d.*; 11, 14*s.*; 14, 20*s.* 6*d.*; CVIII. 3, 4, 5*s.* each; 7, 4*s.*; CIX. 4, 8, 4*s.* each; 9, 5*s.*; 15, 16, 4*s.* each; CXIII. 2, 14*s.*; CXV. 7, 8, 4*s.* each; 11, 3*s.*; CXVI. 3, 4*s.* (coloured). **Yorkshire**, II. 15, IV. 3, 6, 7, 4*s.* each; 12, 3*s.*; 14, 15, 16, 4*s.* each; V. 2, 3*s.*; 15, 4*s.*; XXXVIII. 2, 3*s.*; 4, 5, 4*s.* each; 6, 7, 9, 3*s.* each, 8, 10, 13, 14, 16, 4*s.* each: XXXIX. 1, 3, 4, 5, 6, 7, 8, 11, 12, 15, 16, 4*s.* each; LII. 4, 8, 4*s.* each; LX. 9, 11, 3*s.* each; LXXII. 9, 12, 14, 4*s.* each; LXXXVIII. 4, 4*s.*; 7, 3*s.*; 8, 11, 12, 4*s.* each; 15, 16, 3*s.* each; CLXXIII. 5, 5*s.*; 6, 10, 4*s.* each; CCI. 1, 3, 4, 5, 4*s.* each; 8, 5*s.*; 9, 10, 4*s.* each; 13, 5*s.*; CCXI. 9, 4*s.*; CCXLVI. 8, 12, 5*s.* each; 14, 11*s.* 6*d.*; CCXLVIII. 5, 11*s.* 6*d.*; CCLXXIV. 10, 5*s.*; 6, 13, 4*s.* each; CCLXXXI. 1, 2, 5, 4*s.* each; 10, 3*s.*; 15, 16, 4*s.* each; CCLXXXVII. 3, 4, 11, 15, 4*s.* each; CCXCI. 2, 6, 4*s.* each; 12, 5*s.*; CCXCII. 5, 9, 4*s.* each; CCXCV. 13, 14, 15, 16, 5*s.* each; CCC. 4, 5, 7, 8, 9, 4*s.* each; 10, 3*s.*; 11, 13, 15, 4*s.* each; CCCI. 1, 4*s.* (coloured).

Town Plans—10-feet scale :—

ENGLAND AND WALES: **Blackburn** (Lancashire), LXII. **12**, 18, 5*s.*; 23, 8*s.*; LXII. **16**, 16, 11*s.* 6*d.*; 22, 8*s.* **Withington** (Lancashire), CXI. **6**, 25, 8*s.*; CXI. **7**, 2, 5*s.*; 7, 8*s.*; 11, 5*s.*; 4, 5*s.*; 17, 5*s.*; CXI. **10**, 5, 5*s.*; CXI. **11**, 16, 4*s.*; CXI. **10**, 4, 5*s.* (coloured). This town is now complete in 44 sheets. Index, 4*d.*

Publications issued since September 12th, 1893.

1-inch :—

ENGLAND AND WALES :—257, 269, hills shaded in black and brown, 314, engraved, filled, 1*s.* each.

IRELAND :—148, hills shaded, 1*s.*

6-inch—County Maps :—

ENGLAND AND WALES :—**Yorkshire,** 86 N.E., S.E., 94 S.W., 111 S.W., 124 N.W., 159 S.W., S.E., 160 S.E., 161 N.E., 176 N.W., S.W., 191 S.E., 192 S.E., 276 N.W., 277 N.W., N.E., 283 N.W., 289 S.E.

25-inch—Parish Maps :—

ENGLAND AND WALES :—**Lancashire,** LII. 11, 4*s.*; 12, 5*s.*; 15, 4*s.*; 16, 5*s.*; LIII. 2, 5*s.*; LIV. 2, 3, 6, 7, 8, 4*s.* each; LX. 1, 5*s*; 2, 3, 4*s.* each; 4, 5*s.*; 6, 11, 14, 15, 4*s.* each; LXIII. 1, 4*s.*; 4, 5*s.*; 5, 7, 4*s.* each; 8, 5*s.*; 9, 12, 13, 4*s.* each; LXIV. 5, 4*s.*; LXXI. 12, 16, 5*s.* each; LXXII, 2, 3, 4*s.* each; 13, 5*s.*; LXXXI. 1, 2, 3*s.* each; 3, 6, 4*s.* each; 7, 5*s.*; 8, 4*s.*; 9, 5*s*; 11, 4*s.*; 12, 3*s.*; 14, 5*s.*; 15, 16, 3*s* each; LXXXVIII. 4, 5, 8*s.* each; 7, 5*s.*; 11, 11*s.* 6*d.*; XCI. 12, 4*s.*; 15, 5*s.*; 16, 4*s.*; C. 1, 2, 4*s.* each; 3, 5*s.*; 5, 6, 13, 14, 4*s.* each; CI. 1, 2, 4*s.* each; 3, 5*s.*; 4, 6, 4*s.* each; 8, 5*s.*; 11, 12, 5*s.* each; CIX. 11, 3*s.*; CXV. 3, 5*s.*; 13, 5*s.*; CXVIII. 3, 4*s.* (coloured). **Yorkshire,** V. 1, 5. 6, 9, 10, 13, 14, 4*s.* each; LIX. 4, 3*s.*; 6, 4*s.*; 8, 3*s.*; 13, 4*s.*; 15, 3*s.*: 16, 4*s.*; XCIV. 1. 5*s.*; LXXII. 3, 13, 4*s.* each; LXXXVIII. 3, 3*s.*; 9, 14, 4*s.* each: CXXXIX. 1, 2, 3, 4, 5, 4*s.* each; 6, 5*s.*; 7, 8, 9, 11, 12, 13, 14, 4*s.* each; CLV. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 4*s.* each; CCI. 2, 5*s.*; CCIII. 11, 12, 16, 4*s.* each; CCXVIII. 9, 8*s.*; CCXXXV. 9, 5*s.*; 13, 4*s.*; 14, 5*s.*; CCXLVI. 4, 4*s.*; 7, 5*s.*; CCXLVIII. 7, 11*s.* 6*d.*; 14, 5*s.*; CCLXII. 9, 11, 4*s.* each; CCLXVII. 1, 2, 3, 4*s.* each; CCLXXX. 4, 4*s.*; CCLXXXI. 4, 6, 7, 8, 11, 4*s.* each; 12, 5*s*; CCLXXXVII. 8, 12, 16, 4*s.* each; CCXCI. 10, 5*s.*; CCXCIV. 6, 5*s.*; CCC. 14, 4*s.* (coloured).

Town Plans—10-feet scale :—

Blackburn (Lancashire), LXII. **11**, 24, 25, 4*s.* each; LXII. **12**, 21, 5*s.*; LXII. **15**, 3, 5*s.*; 5, 8, 5*s.* each; 9, 8*s.*; 10, 8*s.*; 13, 5*s.*; 14, 5*s.*; 15, 11*s.* 6*d.*; LXII. **16**, 1, 8*s.*; 2, 8*s.* (coloured). **Plymouth** and Environs (Devonshire), revised edition, with houses stippled, CXXIII. **3**, 11, 12, 16, 17, 22, 23, CXXIII. 7, 2, 3, 4, 8, 10, 11, 12.

(*E. Stanford, Agent.*)

ASIA.

Central Asia. **Constable and Stanford.**

Map of the North-western Frontier of India, showing the Pamir Region and part of Afghanistan. Scale 1 : 2,000,000, or 31·1 statute miles to an inch. London : Archibald Constable & Co., and E. Stanford. *Presented by E. Stanford.*

All the most recent information has been used in the compilation of this map, which embraces the whole of the Pamir and adjacent countries, and the boundaries as far as they have been settled are correctly laid down. The style of drawing employed is good, the hills being shown in brown, rivers and glaciers in blue, and the map is not overcrowded with names. The whole effect is pleasing and conveys an accurate idea of the topography of this region.

China. **Waeber.**

Map of North-eastern China. By Charles Waeber, 1893. Scale (centl.) 1 : 1,355,000, or 21·3 statute miles to an inch. A. Ilyin, Geographical Establishment, St. Petersburg. 4 Sheets. *Presented by the Author.*

The area included in this map is from latitude 30° N. to 43° 20′ N., and longitude 112° E. to 125° 22′ E. It is drawn on Mercator's projection. A table explaining the signification of the symbols used to denote the importance of towns, native terms, and abreviations is given. The hills are shown in brown, and the water in blue; all the principal roads and canals are laid down, and the boundaries of the provinces, and the Mongol clans are clearly indicated. It would appear from the letters and numbers on the margin that it is intended to be used with an index, but in the present instance this has not been presented with the map.

AFRICA.

Mashonaland, Matabililand, &c. **Stanford.**

A Map of Mashonaland, Matabililand, Khama's Country, &c. The British South Africa Company's Territory South of the Zambesi, 1893. Scale 1 : 1,000,000, or 15·8 statute miles to an inch. London, published by Edward Stanford, 1893. *Presented by the Publishers.*

This map has been compiled from all the latest sources. No attempt has been made to show the relief; but in other respects it indicates the present state of our geographical knowledge of this part of Africa. Notes having reference to the character of the country and the rivers are given, as well as figures indicating elevations above sea-level. The scale is sufficient to admit of a large amount of detail being shown, and goldfields, means of communication by road, rail, and telegraph, are laid down. The want of a good map of this region has long been felt, and the appearance of this, at a time when so much attention is directed to Mashonaland, is most opportune.

North Africa. **Duveyrier.**

Itinéraire de Telemsân à Melila. Par H. Duveyrier, 31 Mai–10 Juin, 1886. Scale 1 : 360,000, or 5·7 statute miles to an inch. Bulletin de la Société de Géographie. 2e trimestre 1893. *Presented by the Société de Géographie, Paris.*

Nyasa. **Wissmann.**

Originalkarte des Nord-Ost-Ufers des Nyasa-Sees. Nach eigenen Aufnahmen gezeichnet von Major H. v. Wissmann, 1893. *Petermanns Geographische Mitteilungen.* Jahrgang, 1893. Taf. 14. Justus Perthes, Gotha. *Presented by the Publisher.*

Somali Land. **Robecchi-Bricchetti.**

Itinerario de Viaggio da Obbia ad Alula dell' Ingre Luigi Robecchi-Bricchetti. Scale 1 : 500,000, or 7·8 statute miles to an inch. 3 sheets. *Presented by the Author.*

South Africa. **Philip.**

Southern Africa, including the Cape Colony, Natal, South African Republic, Orange Free State, Bechuanaland, Matabeleland, &c. Scale 1 : 3,900,000, or 61·5 statute miles to an inch. London, George Philip & Son, 1893. *Price* 1*s. Presented by the Publishers.*

This is a handy little map for general reference, on which the present state of railway communication is laid down. It would, however, have been more useful if it had been extended to the east, as far as the mouths of the Zambesi, showing the new Beira railway, and marking the limits of the British South Africa Company's territories.

AUSTRALASIA.

German New Guinea, &c. **Deutsche Kolonialgesellschaft, Berlin.**

Kaiser Wilhelms Land und Bismarck Archipel. Scale 1 : 1,000,000, or 15·7 statute miles to an inch. Deutsche Kolonialgesellschaft, Berlin. In Kommission bei Carl Heymanns Verlag. 1893. 4 sheets. *Presented by the Deutsche Kolonialgesellschaft, Berlin.*

The results of all recent surveys are shown on this map, which differs in some respects from those previously published. This is especially the case with regard to Neu Pommern, which is taken from the surveys of Vice-Admiral von Schleinitz. The map is drawn in a bold style, and the lettering is clear.

POLAR REGIONS.

Arctic Ocean. **Jenkins.**

Petshora Bay and Kara Sea. (Norway and Lapland, Supplementary Sheet A).—Gulf of Obi and River Yenisei. (Norway and Lapland, Supplementary Sheet B). Compiled by H. D. Jenkins, F.R.G.S. On one sheet. Published by James Imray & Son, London, 1893. *Presented by the Publishers.*

GENERAL.

The World. **Vidal-Lablache.**

Atlas Vidal-Lablache, Maitre de Conférences de géographie a l'École Normale Supérieure. Histoire et Géographie. 137 Cartes, 248 Cartons. Index alphabétique de plus de 40,000 noms. (L'Atlas complet paraîtra en 24 livraisons). 21e Livraison. Paris: Armand Colin et Cie., Éditeurs. *Price* 1 *fr.* 25*c. each part.*

This part contains a geological map of India, maps of the Chinese Empire, Japan, physical and political maps of Africa, and a map of South Africa. As usual with this atlas, each part is accompanied by explanatory letterpress.

The World. **Kiepert.**

Kiepert's Grosser Hand-Atlas. Neue Lieferungs-Ausgabe in 45 Karten. Ausgabe in 9 Lieferungen à 5 Karten mit statistischem Material und Namen-Verzeichniss mit Bevölkerungsziffern zu jeder Karte. Die statistischem Angaben von Dr. Paul Lippert, Bibliothekar des Kgl. Preuss. Statist. Bureaus. Dritte, in Zeichen-Institut der Verlagshandlung unter Leitung von Dr. R. Kiepert. Teils vollständig neu bearbeitete, Teils gründlich berichtigte Auflage. Berlin, 1893. Geographische Verlagshandlung Dietrich Reimer. Inhaber: Hoefer & Vohsen. Parts III. and IV. *Price* 4 *M. each part. Presented by the Publishers.*

Part III. contains general maps of Europe, Brandenburg, Silesia, and Posen, Spain and Portugal, European Russia, Australasia and Polynesia. Part IV. contains maps of Bavaria, Wurtemberg, Baden, Elsass-Lothringen, Pomerania, West and East Prussia, Central Italy, Netherlands and Belgium, and England. Each map is accompanied by an index and letterpress.

The World. **Johnston.**

W. & A. K. Johnston's Royal Atlas of Modern Geography. Edition in monthly parts. Part 24. W. & A. K. Johnston, Edinburgh and London. *Price* 4*s.* 6*d. each part. Presented by the Publishers.*

This part contains maps of Abyssinia and Upper Nubia, and the southern sheet of a map of South America, with an index for each map.

PHOTOGRAPHS.

Baluchistan. **Survey of India Offices.**

View showing Distortion of Rails caused by Earthquake between Sanzal and Old Chaman. Photo-etching. Survey of India Offices, Calcutta, April 1893. *Presented by Lieut.-Colonel J. Waterhouse, B.S.C.*

This is a photo-etching, showing the remarkable manner in which a railway-track has been distorted by the effects of contraction of the land, caused by an earthquake in Baluchistan.

British East Africa. **Railway Survey Party.**

Seventy-one Photographs taken by the Mombasa-Victoria Nyanza Railway Survey Party, 1892. *Presented by Captain J. W. Pringle, R.E.*

This is a very interesting series of views, taken by the Mombasa-Victoria Nyanza Railway Survey Party. They contain some scenes of great beauty, together with interesting photographs of the different native tribes.

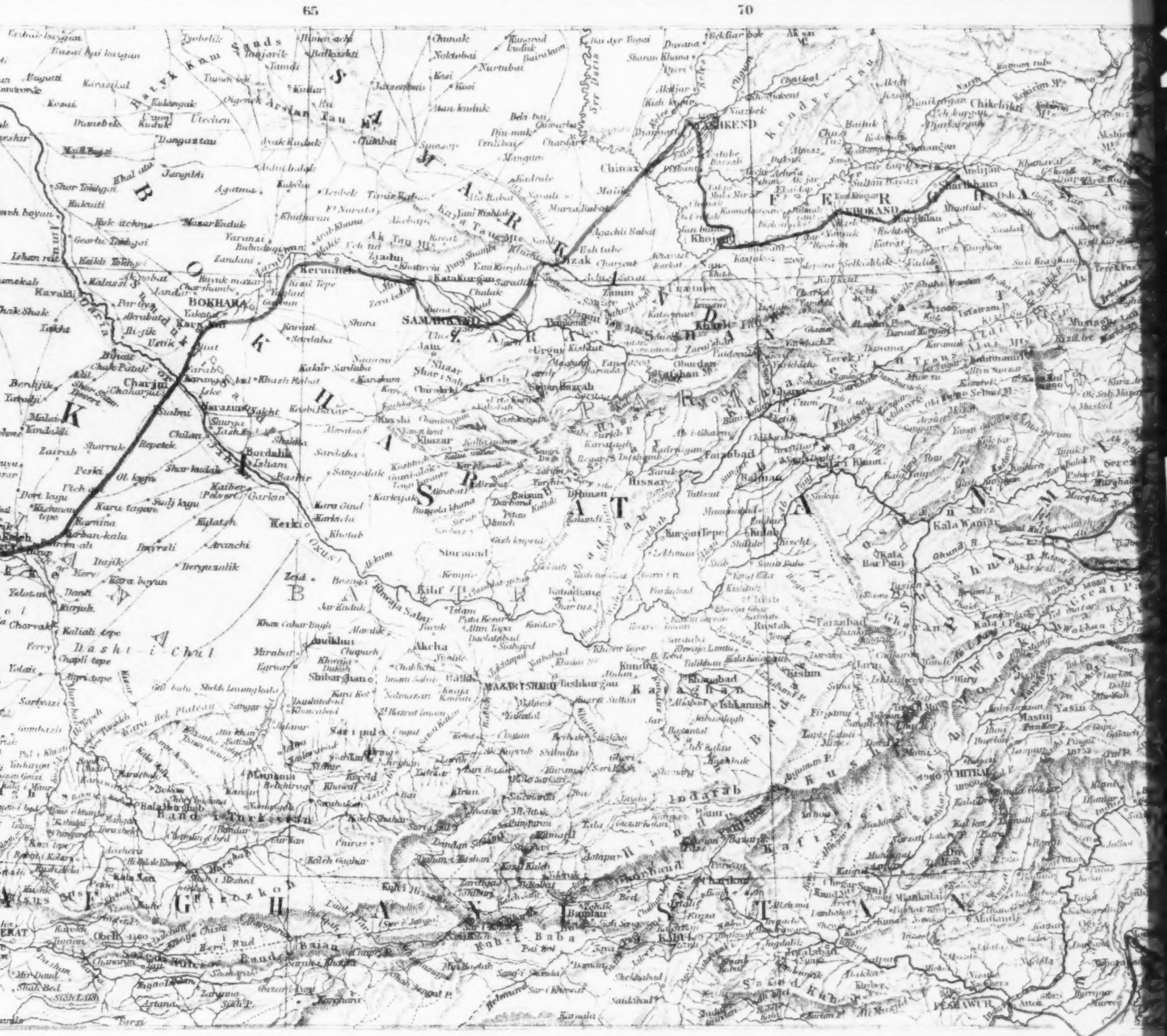
Transvaal. **Gros.**

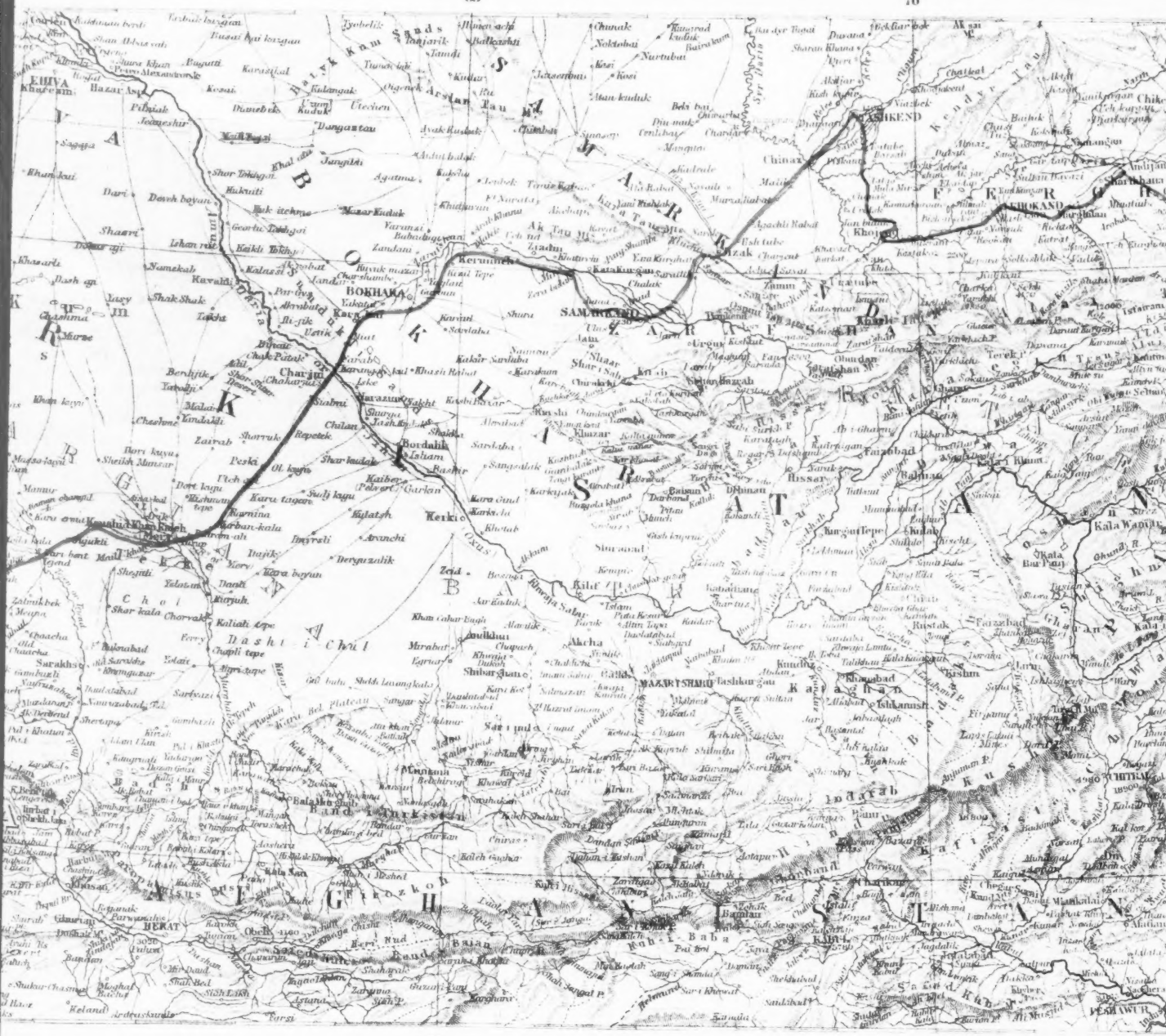
Twenty-Three Photographs of the Transvaal, taken principally by H. F. Gros. *Presented by F. Jeppe.*

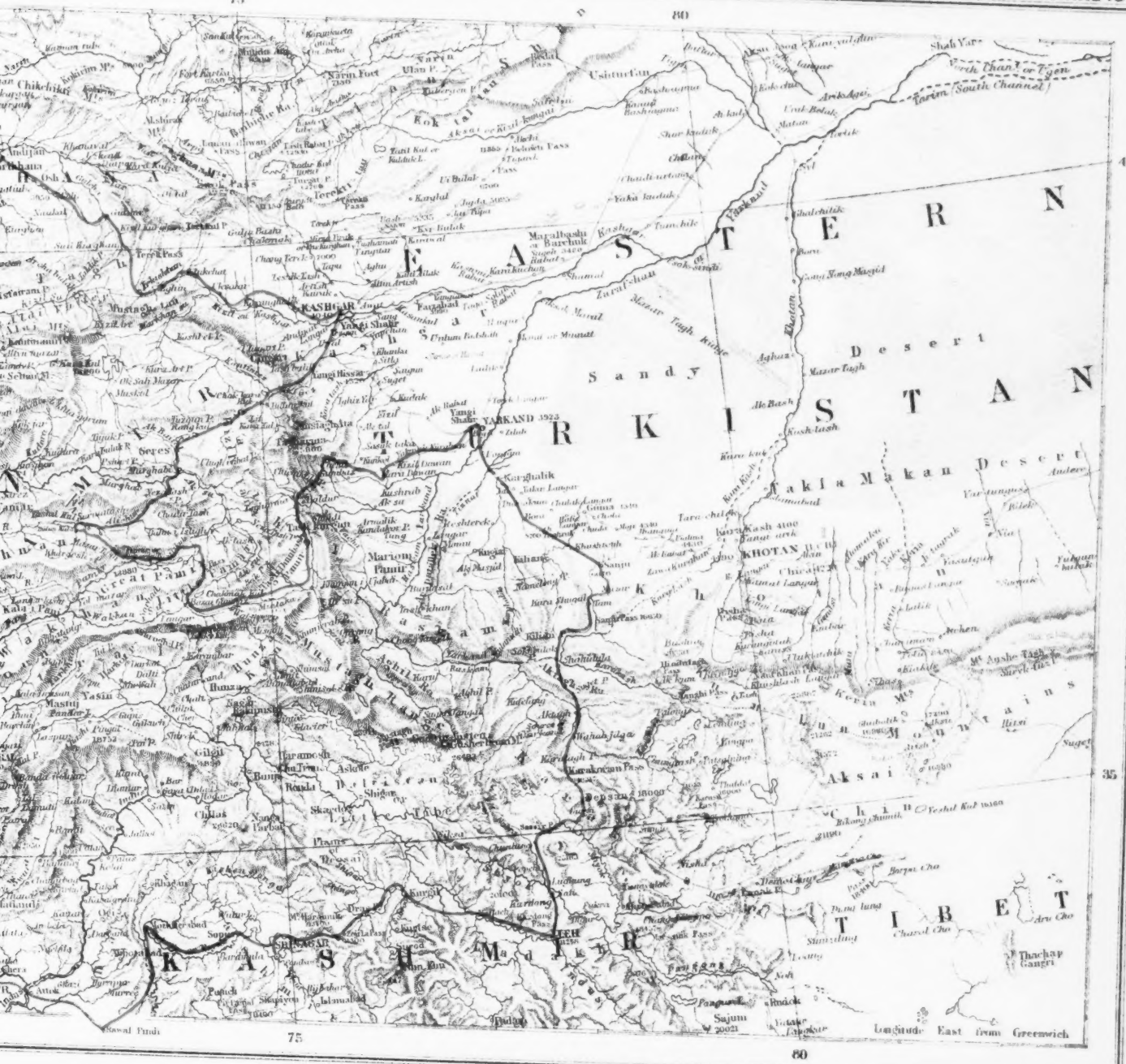
This set of photographs illustrates the scenery and life in the veldt in the Transvaal. Among the most interesting are the Zoutpansberg Kafir chiefs, a native iron foundry, gold-diggers' quarters, and a view of Woodbush, Zoutpansberg.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

MAP OF
CENTRAL ASIA
Showing Route of the Earl of Dunmore
1892-3
English Statute Miles 69·5 1 degree
Route Red.
CASPIAN SEA
PERSIA
KHIVA
ASTRABAD
MASHHAD
HERAT
55
60
40
35


65
70
BOKHARA
SAMARKAND
KHOKAND
TASHKEND
Kerminé
Charjui
Bordalik
Kilif
Amu Darya
Oxus
Zarafshan
Kara Kum
Kizil Kum
Hissar
Farzabad
Kunduz
Khanabad
Kala Wamar
Kala Bar Pam
Kala Panja
Kala Nawabad
Kala Yasin
Mastuj
Chitral
Yarkand
Kashgar
Khotan
Aksu
Kuldja
Issik Kul
Narin
Andijan
Margilan
Namangan
Osh
Ak Tau Mts
Kendyr Tau
Alai Mts
Trans Alai
Pamir
Hindu Kush
Kara Tau
Nuratau
Chinaz
Khojend
Yangi Kurgan
Katakurgan
Urgut
Jam
Chupan Ata
Kara Kul
Yashil Kul
Rud-i-Baba
Kabul
Kabul R.
Kunduz R.
Khanabad R.
Surkhab
Kokcha R.
Kokcha
Bamian
Ghori
Ghori R.
Maimana
Andkui
Akcha
Shibarghan
Mazar-i-Sharif
Balkh
Tashkurgan
Khulm
Aibak
Kilif
Kara Kul
Yashil Kul
Kara Tau
Nuratau
Chinaz
Khojend
Yangi Kurgan
Katakurgan
Urgut
Jam
Chupan Ata
Kara Kul
Yashil Kul
Rud-i-Baba
Kabul
Kabul R.
Kunduz R.
Khanabad R.
Surkhab
Kokcha R.
Kokcha
Bamian
Ghori
Ghori R.
Maimana
Andkui
Akcha
Shibarghan
Mazar-i-Sharif
Balkh
Tashkurgan
Khulm
Aibak
65
70


60
65
70
KHIVA
Khanate
BOKHARA
SAMARKAND
TASHKEND
KHOKAND
Kermineh
Karakul
Bordalik
Kerki
Charjui
Balkh
Tashkurgan
Kunduz
Khanabad
Ishkamish
Faizabad
Kala Wamar
Kala Panj
Rustak
Jerm
Khulm
Tash Kurgan
Aibak
Kahmard
Bamian
Kabul
Kohistan
Kohi Baba
Ghorband
Panjshir
Indarab
Kafiristan
Siah Koh
Koh i Baba
Hindu Kush
Paropamisus
HERAT
Obeh
Badghis
Badakshan
Balkh
Turkestan
Afghanistan
Bokhara
Khanate
Kohistan
Ghorband
Panjshir
Kafiristan
Indarab
Khulm
Tash Kurgan
Aibak
Kahmard
Bamian
Kabul
Kohi Baba
Siah Koh
Hindu Kush
Paropamisus
HERAT
Obeh
Badghis
Badakshan
Balkh
Turkestan
Afghanistan
Bokhara
Khanate
65
70



See Note referring to this Map, Page 402

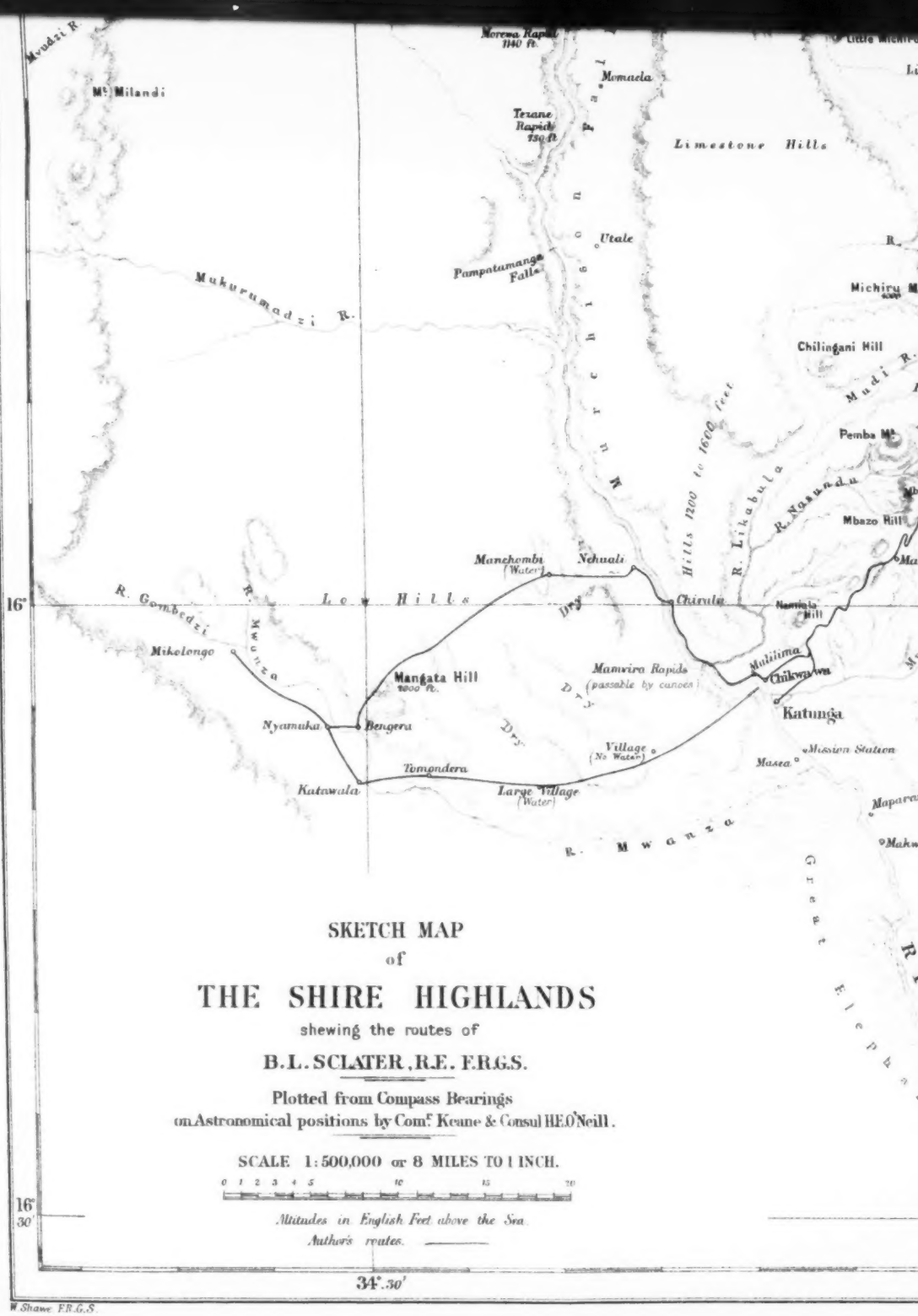
480

SKETCH MAP

of

THE SHIRE HIGHLANDS

35°
35° 30'
36°
15°
30'
16°
Limestone Hills
Villages of Mpimbi
Mpimbi
B.C.A.S.Station
Genasu
R. Domasi
Domasi Mission-Station
R. Zangani
R. Lisangala
Zomba Mtn
5133
High Plateau
Zomba Peak
Villages of Milanya
Zomba (The Residency)
Mt Sharrer's Plantation
Mlungusi River Plantation
Lakangala Plantation
Rise of 1000-1500 feet
Rise of 1000 feet 3000 ft.
Low Hills
R. Mafuai (dry)
Gwaza
Villages of Milanji
Latope
L.C.M.Station
Myuu Water
Retulu Hill
Mirali Hill
R. Mkuru
R. Namizimu
Usinene Hills
Chifumbwi Mt
3500
Zedi Mt
3500
Mtalika Hill
R. Ntondwi
Plateau Namasi
Mlango Hill
Namasi
B.C.A.S.Station
R. Makoka
R. Mombezi
Mitambwi Mt
Low Hills
Chipanda
Lunzu
Nalikosio Hill
Mt Sharrer's Plantation
R. Cherimba
Namilango
Missions Station
Chiradzulu Mt
3000
Villages of Kamponya
Lunzu Plant.
Tawira R.
Mombezi Plant.
Ndirandi Mt
BLANTYRE
Ndudi Hill
Mpingwi
Bangwi
Village
Malabvi
R. Luchenza
Mt Sochi
4200
Plantation
Villages of Kapini
Mbami Hill
R. Limbe
Chigamula Hill
Chingasi Hill
Choda Hill
Rolling Plateau
Dense Forest
Plantation
Midima
R. Techila
Rolling Plain 2000 ft.
poorly forested
Rolling Plateau 3000 feet
Swadzi R.
Villages
Mt Cholo
4000 ft.
Plateau 3000 ft.
Chinyonedzi R.
Kwa Chinoma
Kizumba R.
Goma
Rolling Plateau
Scrub Forest & Open Grass Spaces
Low flat lands
R. Palombe
R. Namasi
Scrub Forest with open patches
Magomero
R. Mombezi
Open Grass Plain
Plain
Scrub Forest
with Open patches
Grassy Plain with clumps of trees
Village
Kada
Village
Mkandola
R. Likabula
Namondes
Cof S. Mission
Plateau 6000 ft.
Chikumbo
Plantation
Plant.
Village
Government Station
Chipoka's
R. Likabula
Mabuka
R. Luchenza
Village
Plantation
Mwambulu
Pine Forest
R. Ruo
R. Mulosa
Mt Machingeri
Mutagwiri
Mt Mangasanga
Lua R.
Eastern Peak
MT. MILANJI
Mt Cheza
Tundu H.
Masingalo H.
Jagaja
Mauzi Hill
Migoi R.
Machemba H.
Nangoma Hill
R. Lukolezi
R. Palombe
Kilonji H.
Sombani R.
Limbi Lake
Kalindi
Mburiswe
Mlambala H.
Makoka H.
Tandu H.
Mwanji
Masakala H.
Kisacho
Mkula
Nachuma
Ana Mlupa
Che Mlolo
Mlunguzi R.
Ukwalula
Pirimiti
R. Likangala
Mpyupyu
R. Nanyenga
R. Naisi
LAKE SHIRWA



SKETCH MAP
of
THE SHIRE HIGHLANDS
shewing the routes of
B. L. SCLATER, R.E. F.R.G.S.

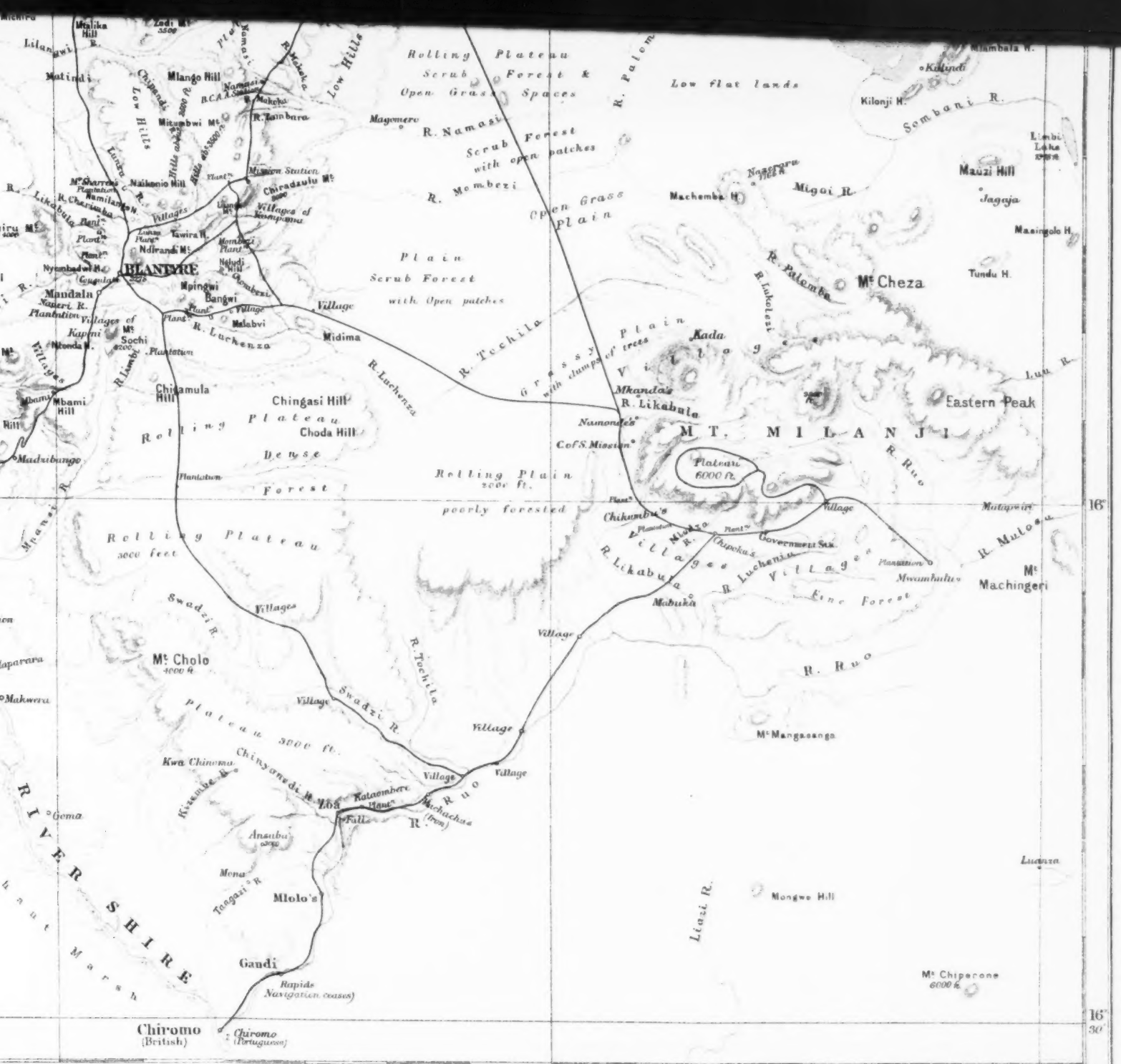
Plotted from Compass Bearings
on Astronomical positions by Comr. Keane & Consul H.E. O'Neill.

SCALE 1:500,000 or 8 MILES TO 1 INCH.

0 1 2 3 4 5 10 15 20

Altitudes in English Feet above the Sea.
Author's routes. ——

W. Shawe F.R.G.S.



Published by the Royal Geographical Society, 1893.

Turner & Shaw, 43, Brewer Street, W.